No. 15840

United States
Court of Appeals
for the Ninth Circuit

STATE OF CALIFORNIA; UNITED STATES OF AMERICA, et al., Appellants,

vs.

EVERETT G. RANK, et al., Appellees.

Transcript of Record

In Six Volumes
VOLUME IV.
(Pages 1287 to 1736, inclusive)

Appeals from the United States District Court for the Southern District of California, Northern Division

(Testimony of Charles H. Lee.)

The Court: As it now flows?

The Witness: As it now flows.

This ravine I spoke of is in the higher land back of the bluffs, and it ends right at the edge of the bluffs. [998]

The Court: It doesn't continue into the present channel?

The Witness: No, it can't go into the present channel, because it is much higher than the present channel.

The Court: It lies southwesterly of what appears to be a rather wide vein or trough in that river shown on the map?

The Witness: Yes.

The Court: The bottom of it shows——

The Witness: The bottom of it is in the bluff about a half mile wide, and this channel is at the upper level of the bluff.

The Court: And crosses the railroad?

The Witness: Yes. I am now indicating its position, as shown by the topography, and continuing southerly from the point of beginning, following the meanderings, as shown by the topography, southerly across Barstow Avenue, Shaw Avenue, the Herndon branch of the Southern Pacific, Shields Avenue, and the branch fades out at that point, and the vein continues southerly across Shields Avenue, McKinley, and southwesterly to the southern edge of the quadrangle. Then it goes into the Kearney Park quadrangle.

(Testimony of Charles H. Lee.)

Continuing in this quadrangle, the Kearney Park, it carries it to the Jamesan Avenue.

Q. (By Mr. Rowe): Mr. Lee, will you mark that blue line on both of [999] those quadrangles with a circled "1" in blue?

The Court: How is he going to mark it?

Mr. Rowe: It is a blue line.

The Court: Is that blue or green?

The Witness: I am using a blue color, a sort of a robin's egg blue.

The Court: It is not a solid line? It is a check line?

The Witness: As I drew it, I drew it in a dashed line.

I am numbering this one just west of Herndon——

The Court: Take it way over to the edge of the map, just a straight line, and on the margin of the map mark "L" for Lee, "1." Then draw a straight line, with an arrow which ends at the line "L-1."

The Witness: I have done so.

The Court: And now on the other quadrangle.

(Witness complies with request.)

The Court: All right, "L-1" represents—how do you describe that? What would you call it?

The Witness: That represents an old channel of the San Joaquin River, but where the river flowed before it had cut its present deep channel which it now occupies. [1000]

The Court: You said that there were several channels. Is it your opinion that this is the last

(Testimony of Charles H. Lee.)

previous one to the present channel, or can you describe it in point of time?

The Witness: This channel is one of the most recent. It lies along the edge of what appears to be the most recently deposited portion of the cone of the San Joaquin River.

It would be noted on the Herndon sheet that the blue lines I have just drawn lie very close to a broad red line. That red line was the line which indicated as being a division between the ancient cone of the San Joaquin River and the modern cone. And this channel is apparently the channel which the river followed in the initial stages of building up the modern cone.

The Court: What you call the modern alluvial cone?

The Witness: The modern alluvial cone of the river. So that it is one of the most recent channels of the river.

The Court: Now it ended, you said where did it end?

The Witness: Well, I have carried it to——

The Court: No—oh, you have carried it even further?

The Witness: It can be carried further. I have carried it on the Herndon sheet to the edge of that sheet, but it can be carried further out to the trough of the valley.

The Court: You might just as well do it now because if you do not do it now somebody on cross examination will ask you to. [1001]

(Testimony of Charles H. Lee.)

You do not have that quadrangle?

The Witness: I have the quadrangle but——

The Court: It is not in that exhibit? There is only one small one there. What is the name of that quadrangle?

The Witness: Herndon.

Yes, I find it in the exhibit. No, Kerman.

The Court: Kerman is not here.

The Witness: It is on another scale. It is in the exhibit.

The Court: Very well.

The Witness: (Marking on exhibit.) This particular channel which I followed out is near the margin of the modern alluvial cone on the Kerman sheet and pitches out, but there are branches which can be picked up and carried through, which I will now do. (Marking on exhibit.)

Mr. Rowe: Will you mark that L-1 too?

The Court: He did not put any marks on there on the last one.

The Witness: There is another quadrangle which is not in Exhibit 30 which covers a portion, a gap.

The Court: What is that quadrangle?

The Witness: It is Biola.

The Court: Do you have that here?

The Witness: I have it here but I do not think that it is in the exhibit. [1002]

Yes, I find it.

The Court: Now, taking off of L-1 what you call a branch, is that it?

The Witness: Yes, I am now taking off on the

(Testimony of Charles H. Lee.)

branch at Barstow Avenue crossing, a branch leading to the southwest from L-1.

Mr. McPherson: On what quadrangle?

The Witness: This is on the Herndon quadrangle, and I am marking it L-2.

The Court: Now you are following that one out?

The Witness: I am now following that branch out.

The Court: Biola?

The Witness: I was looking for it.

The Court: It is a small one. You had it a moment ago.

The Witness: (Marking on exhibit.)

The Court: You took off another branch from that branch L-2?

The Witness: Yes. These channels subdivide as they go down and the ravine in which the channel started extends out further into the valley and would pass into ridges for the reason that the channel in the ravine would be carrying debris——

The Court: Just like a small irrigation ditch does?

The Witness: Like a small irrigation ditch, and would at its lower portion, its grade would cause it to spread the [1003] debris out which it was carrying from above so that it changes from a ravine to a ridge at a point where this branch is shown on the Herndon sheet.

Now the branch which represents a pile of debris

(Testimony of Charles H. Lee.)

from that little stream I am marking L-3 and then following that through.

The Court: On the Biola sheet?

The Witness: On the Biola sheet.

The Court: As well as the old river bed on the Biola sheet?

The Witness: Yes. The old river bed pitches out in a flat area.

The Court: L-2?

The Witness: L-2, yes, on the Biola sheet. And I am marking that L-2. And then I am marking——

The Court: That is your Biola sheet. You had better mark this Biola sheet on the exhibit.

The Witness: (Marking on exhibit.)

The Court: You have now turned to the Biola sheet on Exhibit 30?

The Witness: Yes, I am now on the Biola sheet of Exhibit 30 and am marking the position at the end of the channel L-2 which pinches out, and the end of the channel L-3 which continues as a ridge.

These ridges have been used in the location of [1004] irrigation ditches because they are at a higher level and permit water being run out on either side and they are therefore very convenient for irrigation ditch distribution system locations.

I have marked L-3 on the Biola sheet. [1005]

The Court: And "L-2"?

The Witness: And also "L-2."

The Court: You say "L-2" peters out down there some place?

(Testimony of Charles H. Lee.)

The Witness: Yes. As far as any distinctive feature is visible on the property, it pinches out in the flat area.

The Court: Where? What is that township and range?

The Witness: It is in the vicinity of the Empire School, Clinton Avenue near Howard Avenue.

The Court: All right. Now, in your opinion the river first flowed in "L-3," before it flowed in "L-2"? Or was it flowing alternately, in cycles of a year or a few years, from time to time in one or the other?

The Witness: In my opinion, it was a progressive build-up. It would follow out on one ridge, building up deposits there until the ridge got as high or higher than the surrounding country, then the succeeding flood would break over.

The Court: And go into that channel until it got higher than the other, then go back into that?

The Witness: It might, or it might go into a different location on the other side of the ridge. It is a subdivision like the hand, where each finger in turn becomes a subdivision of the other, and it becomes a complicated system of subdivision; and if a channel is cut subsequently, [1006] a subsequent stream may cut into ridges previously formed, and cut across them. So it becomes a system not alone of subdividing channels, but subsequently channels crossed by other channels, and the cone is built up in that manner.

It is a process which is responsible for the cones

(Testimony of Charles H. Lee.)

throughout the southern part of the state and in the San Joaquin River, where, from year to year, debris is deposited from upstream.

The Court: Is that stream any different than, say, a stream that comes from a garden hose and flows down onto a flat piece of ground?

The Witness: No, exactly the same, except the stream is larger and more continuous and carries more debris.

The Court: Yes. My garden hose never does bring down any redwood logs.

The Witness: These maps are hard to mesh together.

The Court: Isn't there one set of maps the same scale, or did the Government quit printing that size?

Mr. Hill: That is right.

The Witness: This is a newer map, on a larger scale.

Now, I have started out on the branch which pinches out into the flat area, and I will end that and go back and pick up another.

The Court: You are ending "L-3"?

The Witness: "L-3." Now I will start back at "L-4." [1007]

The Court: "L-4" on the Biola branch, which takes off of "L-3"?

The Witness: Yes.

The Court: In the vicinity of what? Well, give the section, township, and range.

The Witness: It is in Section 32, Township 13

(Testimony of Charles H. Lee.)

South, Range 18 East. I have marked this "L-4" on the Biola sheet.

The Court: And you go from there——

The Witness: Onto the Kerman sheet.

Mr. Green: Might I suggest that we have a recess, and we could perhaps proceed more expeditiously?

The Court: I would think so.

Mr. Rowe: I might explain to the court the reason for this method.

If the court will recall, the court asked for the topographic maps, which Mr. Lee has, and they were introduced before he got this blue line on. We cannot come in during the recess of the court and add to a court exhibit. So this is the only way we can get it on.

Mr. Green: We will stipulate he can add it during the recess and explain what he has done, after he has drawn them on.

The Court: I think so.

Mr. Child: I make the motion. [1008]

The Court: How many more river beds do we have? He has just taken off one, one on the San Joaquin.

The Witness: Well,——

The Court: Is that what you call bifurcation?

The Witness: Well, a subdivision is sometimes called "bifurcation."

The Court: How many did you take off the San Joaquin? I suppose you have some above each of the cones?

(Testimony of Charles H. Lee.)

The Witness: Yes.

The Court: And some below?

The Witness: Yes.

The Court: How many?

The Witness: Twenty or thirty.

The Court: And you expect——

Mr. Rowe: I didn't know that counsel would stipulate. We can probably put it on tonight, if the witness can have Plaintiffs' Exhibit 30.

The Court: He can have it at noon, and tonight too, and at this morning's recess.

Mr. Rowe: Yes.

The Court: Do you have other testimony he can give, or is it necessary to explain this before he goes on to the next?

Mr. Rowe: Well, one of the determinations as to the alluvial cone of the river in this regard—I can ask Mr. Lee the question, rather than testify.

Q. (By Mr. Rowe): Will all these blue [1009] lines, Mr. Lee, stop inside your red meandering line on Exhibit 30?

A. Yes, except those which extend on down to the trough of the valley.

Q. And, in your opinion, do they help determine the exterior boundaries of the alluvial cone in the San Joaquin River? A. Yes.

Q. And do they also indicate waterbearing strata, possibly?

A. They indicate the position of deposits made by the river as it built up the cone. Those various channel lines, when the deposit of the debris is

(Testimony of Charles H. Lee.)

made, as the stream flattens there is often initially a mixture of the cobbles with the pebbles, gravel, sand, silt, and clay, where the stream deposits an enormous load out in the valley. Then subsequently, as the clear water flows, after the storm is past and the stream ceased to carry debris, then the clear water following the channel down to the deposited debris picks up and carries away the clay and silt and the greatest amount of sand, and leaves behind a train of the coarser materials, the pebbles, cobbles, and boulders, if there are boulders, and gravel. And those trains act as—subsequently, [1010] after this channel has been buried by others above, they act as the aquifers which feed the cone, the subsurface portion of the cone.

Q. Any one of these blue lines you are going to put on reach inside the limits of the City of Fresno?

A. Yes, they extend into the northern portion of the City of Fresno.

Q. And do they connect with the San Joaquin River, or any of its quadrants?

A. They hit the bluff at the head of the San Joaquin River up toward Friant, and from there on down.

Q. How far from Fresno Slough or by-pass will these lines extend?

A. There are some of the ridges which can be carried through within half a mile of Fresno Slough by-pass, which represents the edge of the trough in the valley.

(Testimony of Charles H. Lee.)

Q. You have airplane photos that you are going to use, are you not, later?

A. I have some which are adjacent to the bottoms, river bottoms, and immediately adjacent bluffs.

Q. Will some of the take-offs of these blue lines be apparent from the air photos? A. Yes.

Mr. Rowe: I asked these preliminary questions so we can proceed. [1011]

Q. During the noon hour or during the recess, will you add the rest of the blue lines to Plaintiffs' Exhibit 30? A. Yes.

The Court: Numbering them consecutively, so you can explain them.

The Witness: Yes.

The Court: All right.

Mr. McPherson: I move we have a recess.

The Court: Yes; a recess.

(Short recess taken.) [1012]

Mr. Goldberg: If your Honor please, shortly before the recess Mr. Bean told me that a map had been prepared along the lines which I think your Honor was interested in this morning. We have here a blueprint of a number of these geological survey quadrangles with the 25-foot contour intervals emphasized in red.

The Court: There is no reason why these cannot be taken out and pasted on a canvas back except for the fact that they are not the same.

Mr. Goldberg: They are not on the same scale and these have been reduced to an equal scale.

(Testimony of Charles H. Lee.)

By the way, Mr. Ingerson says this is not a blueprint, although it is blue, that it is a photographic reproduction.

Can't we get this any clearer?

The Court: That does not go clear up to Friant, does it?

Mr. Goldberg: Yes, it does.

Mr. McPherson: There is a lot more territory than shown on those quads.

The Court: I see.

Mr. Goldberg: Here is Cobb Island and the Millerton Lake. Here is Friant right up at the top right-hand corner. (Indicating.)

Now it is very hard to handle it in its present form. I think we could get a cloth back put on.

The Court: I think probably it would be a good idea to get a cloth back put on it, and no doubt your experts will be using it, and if you could get a cloth back put on we will mark it for identification and I would like to look at it now and then.

Mr. Goldberg: And we can run off more prints of this, can we?

Mr. Ingerson: Yes, if they are available, and another print can be fixed and we can keep this here until it wears out.

The Court: You had better get a cloth back on it. You can get another print too.

Mr. Goldberg: We will have some more prints.

The Court: If you can, and then furnish Mr. Rowe one so his engineers will have the same thing you have.

(Testimony of Charles H. Lee.)

Also Mr. Nelson has suggested that the county or the Municipal Court over here has large magnetic blackboards that you can put things on without all this bother. This is certainly a very bad easel to work with judging from all the maps we have here.

Does anybody know here how to borrow one? Can you, Mr. Rowe?

Mr. Rowe: I think I could if it is there.

The Court: Suppose you try.

Mr. Rowe: I will do my best. [1014]

The Court: Proceed.

Q. (By Mr. Rowe): Mr. Lee, you are familiar with Plaintiffs' Exhibit 54? A. Yes.

Q. The well logs? A. Yes.

The Court: You are now going to another element or factor that he took into consideration?

Mr. Rowe: Yes.

The Court: And that is the logs of wells?

The Witness: Yes, your Honor.

Q. (By Mr. Rowe): Did you take into consideration any well logs included in Plaintiffs' Exhibit 54 in determining the exterior boundaries of the alluvial cone of the San Joaquin River?

A. Yes.

Q. And have you taken into consideration the logs of other wells? A. Yes.

Q. I believe your office is editing these other logs so that they would be in an easily readable form like Exhibit 54, will they not? A. Yes.

Q. And they are not finished yet? [1015]

(Testimony of Charles H. Lee.)

A. No.

The Court: By "editing" you mean assembling?

Mr. Rowe: The witness used the term "editing."

The Witness: Assembling would be more correct. It is a matter of typing and assembling.

The Court: By "editing" you are not changing them?

The Witness: No, your Honor. I don't know how the word "editing" got in there. Assembling and typing is the correct statement.

Q. (By Mr. Rowe): And you studied these other logs that you will have available here, did you not? A. Yes.

Q. And have you prepared a map from these well logs in Plaintiffs' Exhibit 54 showing the locations of certain wells taken from Plaintiffs' Exhibit 54?

A. Yes, I have prepared a map which shows the location of those wells that are included in Exhibit 54.

Q. And have you that map with you?

A. Yes.

Mr. McPherson: In that connection, am I not correctly informed, Mr. Rowe, that these are the well logs presented by Mr. Segel?

Mr. Rowe: Yes.

Mr. McPherson: Someone told me that [1016] Mr. Segel has intimated that there was some confusion or possibly a mistake in his testimony respecting the deviation or variation from the bench

(Testimony of Charles H. Lee.)

marks on these different measuring media. Am I correctly informed as to that?

Mr. Rowe: I think he is rechecking some of his figures. If there is any change we are going to bring that out through Mr. Segel.

The Court: Mr. Segel, as I recall, indicated on the witness stand that some of the logs that he got from various contractors who had drilled them, that some of the contractors had used their elevation as the top of the pipe and others the top of the ground and also some of them had not indicated what bench mark they had used.

Mr. McPherson: I was simply making the inquiry. I just want to know if he is now going to give the postings from the exhibit as it was offered or as it is being corrected. That is what I am really asking. [1017]

Q. (By Mr. Rowe): We are using this exhibit at the present time, are we not, Mr. Lee?

A. Yes. Exhibit 54 does not involve that point which Mr. Segel was putting in. In other words, any question as to the datum claim is involved in the water level exhibit, not the log exhibit.

Q. And you have gone over to the City of Fresno and checked the various changes, if there were any, have you not?

A. On the water level exhibit, yes. But that does not affect this Exhibit 54, the well logs.

Q. You have prepared a map——

The Court: Wait a minute, now. You are speaking of the logs of wells, that is to say, what they

(Testimony of Charles H. Lee.)

reveal as being an element as differentiated from the water level?

The Witness: Yes. The log of the well, the well drillers use that record to show what was penetrated by the driller when he was drilling the well, and it involves the sequence of the sand, clay, and has nothing to do with the water.

Incidentally, when water is encountered, the driller notes that; but there are no water levels involved.

Mr. McPherson: The corrections will be on Exhibit 55, then? [1018]

The Court: What is that?

Mr. McPherson: The corrections Mr. Segel will make, if any, would be on Exhibit 55?

The Court: The City of Fresno.

Mr. McPherson: Yes.

Q. (By Mr. Rowe): And that has nothing to do with water levels. However, Mr. Lee, you have been to the City of Fresno and made your own check of the accuracy of Mr. Segel's measurements as to water, depth of water, have you not?

A. Yes, since the——

The Court: Well, he is not concerned about depth to water, are you?

The Witness: No.

The Court: At the moment, I mean?

The Witness: No.

The Court: All you are concerned with now is what the logs show, the strata.

Q. (By Mr. Rowe): Mr. Lee, have you that map? A. Yes.

(Testimony of Charles H. Lee.)

Q. And copies?

A. Yes, I have here ten copies, of which one is for you and the others for the other parties interested.

The Court: Is each one as legible as the other?

The Witness: I hope so. They endeavored to make them so.

Mr. Rowe: Two for the court?

The Court: Yes; mark them in evidence.

Mr. Rowe: What is the next exhibit number?

The Clerk: Exhibit 62.

(The exhibit referred to was received in evidence and marked Plaintiffs' Exhibit No. 62.)

Mr. Green: May we have one?

Mr. Rowe: There are two for the court and three——

The Court: One here as an official exhibit will do.

Q. (By Mr. Rowe): Mr. Lee, would you just explain this map, Plaintiffs' Exhibit for identification 62?

The Court: 62 is in evidence.

The Witness: This map, Exhibit 62, represents the portion of Fresno County south of the San Joaquin River, and from Highland Avenue on the east to Madera Avenue on the west, and extends south to American Avenue. The northern edge of the map is the San Joaquin River.

There are three blue lines which traverse this map in a northeast-southwest direction. Those three lines represent the boundary lines between the principal stream cones shown by the surface topography.

(Testimony of Charles H. Lee.)

The most northerly blue line is the line between the San [1020] Joaquin alluvial cone and the Dry Creek alluvial cone. Now, that area north of the most northerly blue line is divided into two parts by a meandering north and south line, starting from the vicinity of Herndon and extending down to the vicinity of Kearney Park.

The portion of the area west of that line is marked "I," and east of that line "II," and those two areas represent, respectively, the modern cone of the San Joaquin—that is number "I"—and the more ancient cone, number "II."

Now, south of that most northerly blue line is another blue line, between which two lines is the III. This represents the cone of Dry Creek.

Q. (By Mr. Rowe): III, and designated as III, that designates the alluvial cone at Dry Creek?

A. Yes. South of that area is the area marked "IV." That area embraces the alluvial cone of Dog Creek, Red Bank Creek, and Fanchier Creek. South of that the area is not designated by number, but it is a portion of the cone of the Kings River.

Now, the location of the wells—— [1021]

Q. Mr. Lee, Dry Creek flows, does it not, through the northern part of the city of Fresno?

A. Yes, the northern part of the city.

Q. Go ahead.

A. The well locations are shown in different symbols. Wells drilled for the City of Fresno are shown in open circles, wells drilled for various landowners are shown by a cross.

(Testimony of Charles H. Lee.)

The Court: That is, privately owned wells?

The Witness: Yes, your Honor.

There are two systems of numbering: the open circle wells of the City of Fresno have one series running from 1 to 43, not all the wells being shown on this map; the private wells run from 1 up to 246, I think it is, of which some are not in Fresno County. The series includes both those that are in Madera County and those that are in Fresno County but there are none of the Madera County wells shown on this map.

Q. (By Mr. Rowe): What do the orange dots represent?

A. The orange color, whether marked at a city well or marked at a private well, represents wells which penetrate cobble beds, cobblestones, as indicated in the driller's log.

The wells which are circled in blue or filled in with blue represent wells penetrating gravel beds according to the driller's log. [1022]

Q. What kind of a stream carries cobbles?

The Court: Carries cobbles?

Mr. Rowe: Yes, transports cobbles.

The Witness: A stream of considerable magnitude having high velocity.

Q. (By Mr. Rowe): And you have indicated—not to interrupt you, but you have indicated—cobble wells within the city of Fresno, have you?

A. Well, wherever there are any, yes. There are some I note that are within the city limits, 52 and 38 of the city series, 17——

(Testimony of Charles H. Lee.)

The Court: 21?

The Witness: 21 is a private well. It is within the city limits, however.

Q. (By Mr. Rowe): Now in which cone are the cobble wells, or most of them?

A. I might point out that the wells which have neither color are wells in which neither gravel nor cobbles appear and the formations being either sand or clay or fine volcanic debris, but neither cobbles nor gravel appear.

What was the question, Mr. Reporter?

(The question referred to was read by the reporter as follows: [1023] "Q. Now, in which cone are the cobble wells, or most of them?")

The Witness: Answering the question, the cobble beds appear in the well logs of wells located primarily within the ancient cone of the San Joaquin River.

There are such wells extending from the upper end of the cone, at the upper limits of the map, clear through to Braley Avenue and two or three west of that, one of them almost as far west as the north and south line between Kearney Park and Herndon, and one even west of Kearney Park.

There are a few wells showing cobbles in the Dry Creek area, No. 17 of the city of Fresno is one such well, and private wells No. 21, 181, 113 and 98.

The Court: 37?

The Witness: 37 is one of the city wells. That is just beyond the cone of Dry Creek in the northern edge of the Dry Creek cone.

(Testimony of Charles H. Lee.)

Q. (By Mr. Rowe): What does the fact that there are cobbles in the Dry Creek cone indicate, if anything?

A. The fact of there being wells within the Dry Creek cone having cobbles indicates that a stream of large magnitude and high velocity flowed at that point at one time. The only such stream in this vicinity and a stream which geologic study indicates has been there from the earliest geological times is the San Joaquin River, the point of exit from the [1024] mountains being just above Friant and at the head of what the topography indicates to be the cone of the San Joaquin River.

There is no large stream such as the San Joaquin south of the San Joaquin until Kings River Canyon is reached and Kings River. The intermediate streams are small, their watersheds are small, and have not extended back into the mountains to collect large quantities of water to produce streams of large magnitude which would be capable of carrying cobblestones far out into the valley.

The fact of there being a few wells showing cobble beds in the Dry Creek cone area would indicate the condition of overlapping which always is to be noted with respect to adjacent cones. At one time one stream may lap over onto the other in depositing, and then swing back into the first stream itself. It is an interfingering condition which is limited to a zone at the margin of cones. It would indicate therefore that the San Joaquin River at one time did extend its cone south of the present topographic

(Testimony of Charles H. Lee.)

boundary of the San Joaquin and Dry Creek cone, but that subsequently since the San Joaquin has cut down into its present deep valley so that it cannot get out onto the surface of the cone, that Dry Creek has built up its cone without opposition and has spread over onto the margin of the old San Joaquin cone.

The Court: The fact that there are no cobble beds except this one, No. 37, lying southerly from what you call the [1025] Dry Creek cone, suggests that the area marked III and IV on your map were not built up as part of the Kings River cone.

The Witness: In my opinion they were not, for the reason that the well logs south of No. 37 and east of No. 37 for many miles do not contain cobbles nor gravel such as Kings River could carry.

The Court: Neither cobbles nor gravel?

The Witness: Neither cobbles nor gravel such as Kings River could carry.

The Court: Have you examined the logs of wells within the Kings River cone?

The Witness: I have examined some on the margin of the Kings River cone.

The Court: In the past in your studies? I think you said you made a study of the Kings River.

The Witness: Many years ago, yes. And the logs that we examined at that time were south of the Kings River but on the Kings River cone.

The Court: In other words, did the same kind of effluvia come out of the mountains in the Kings River as comes out on the San Joaquin?

(Testimony of Charles H. Lee.)

The Witness: Yes.

The Court: Go ahead, counsel.

Q. (By Mr. Rowe): And Dry Creek even today is building up its cone [1026] except as stopped by that Army installation? A. Yes.

Q. And it has built up its cone in recent years——

The Court: The question and the answer is unintelligible to me because I do not know what the Army installation is. You mean the one in Korea?

Mr. Rowe: No.

The Court: All right.

Q. (By Mr. Rowe): Is there an Army installation on upper Dry Creek, a flood control dam?

The Witness: I understand there is a flood control dam on Dry Creek which is in the foothills northeast of Fresno.

The Court: How big a dam?

The Witness: It is large enough to retain and divert over into the San Joaquin watershed floods coming down Dry Creek which formerly caused considerable inconvenience in the city of Fresno.

The Court: Who runs it?

The Witness: I think the Fresno Irrigation District may have some maintenance connection with it by agreement.

Mr. Rowe: I have another witness on that.

The Court: Very well. [1027]

Q. (By Mr. Rowe): Until that dam was in, was Dry Creek building up its cone?

A. Yes, building up its cone. It frequently

(Testimony of Charles H. Lee.)

flooded the streets of Fresno, depositing silt and sand, trying to build a cone up over the paved streets of the City of Fresno.

Q. Now, there are certain red lines on this map. Will you explain what they are?

A. Those red lines represent the position of so-called geologic sections along which wells are located, the logs of which were used in preparing a diagram such as we call a geologic section, which represents a section cut down into the earth along those lines, and upon which graphically the well logs can be portrayed.

The Court: By the way, have you made any study as to the depth, the greatest depth of water-bearing strata in this area?

The Witness: Only as——

The Court: Usable water. I suppose you can get salt water.

The Witness: Only as revealed by the well logs which we studied in this Exhibit 54, and others. One of the exhibits. None of the wells in the Fresno area which are drilled for water go to great depth.

The Court: Well, have you had available to you, and [1028] used, the oil well logs which are drilled in the general vicinity of Fresno?

The Witness: I have had two or three. The authenticity of at least one of them is a questionable one.

Mr. Rowe: In other words, a promoter bringing out the oil-bearing strata in a wildcat well.

The Court: Well, they have to go through the

(Testimony of Charles H. Lee.)

same strata as the water wells go through. Sometimes they don't keep any record for the first 2000 feet, if they are going down eight or nine thousand feet. They say "conglomerates."

Mr. Rowe: If the court is interested in wildcat promotion wells, we will get the log showing the oil, gas——

The Court: The State of California has what seems to me to be a pretty good record of oil wells, and requires their inspection.

Mr. Rowe: We have that, and also have some witnesses.

Q. (By Mr. Rowe): Mr. Lee, would you explain the red lines on this exhibit?

A. Well, continuing my explanation, there are four such sections——

The Court: Cross-sections?

The Witness: Cross-sections, indicated in red on this map. The location of them is shown. [1029]

Q. (By Mr. Rowe): Now, in your legal description, in the City of Fresno, in placing that north or south of the topographic boundary line of the alluvial cone, did you give consideration to these wells showing cobbles, farther south than the boundary line of the alluvial cone?

A. I gave some consideration. Referring to Exhibit 30, it appears that the conventionalized legal boundary of the cone, following section lines, lies from half a mile south of the topographic boundary to, at some points, as much as three-quarters of a mile.

(Testimony of Charles H. Lee.)

The zigzag line in the City of Fresno is all south of the topographic boundary, and lies from a quarter to three-quarters of a mile south.

The Court: And all of the cobblestone wells are within that boundary?

The Witness: They are not.

The Court: They are not within the zigzag line?

The Witness: There are some that are south of it.

The Court: I see.

The Witness: At other points, in comparing the legal description, I zigzagged back and forth over the solid red line; but in the City of Fresno, in view of the fact that there was some overlapping of the Dry Creek cone over the San Joaquin cone, I gave it a margin of a quarter to three-quarters of a mile. But there are some of the cobblestone [1030] wells that are beyond that line to the south.

The Court: Beyond your legal description?

The Witness: Beyond the legal description, yes.

Q. (By Mr. Rowe): Mr. Lee, where two cones intermingle, is there any passage of water between those two cones?

A. In some localities there may be impeded progress, and in some there may be very little movement, the reason being that the margin of a cone tends to be the area where the fines collect, that is, the silts and clay. So that on two adjacent cones the tendency of the water to run off of the ridges and down into the sag, carrying with it the silt and clay and depositing it there, causes a

(Testimony of Charles H. Lee.)

greater percentage of fine materials to exist, and so acts as a retardant and, in many cases, a barrier to movement from one cone to another.

Q. What do I understand you to say is the first material a river deposits as it comes out of the mountains?

A. The first material to be deposited is the coarsest material, where the velocity is reduced by the stream passing from its deeper grade in the mountains to the flatter grade in the valley.

The Court: The coarsest or heaviest?

The Witness: It is both. Coarser material is usually the heaviest, unless it is pumice. In the case of [1031] pumice, rock could be carried five and six feet in diameter, could be carried well out into the valley, if the water is deep enough to carry it.

The Court: And the current strong enough?

The Witness: And the current strong enough. So there are two points involved, both size and weight. It is the heavy——

The Court: Principally weight?

The Witness: Well, some pieces of pumice may be rather large for a stream to handle.

Q. (By Mr. Rowe): Mr. Lee, are cobbles considered coarse material?

A. Cobbles are considered coarse material, the usual sequence being boulders, cobbles, pebbles, gravel, sand.

Q. After the river drops cobbles, it drops what else as it goes out into the valley?

(Testimony of Charles H. Lee.)

A. Farther out the gravel is deposited, and the sand, and silt, and clay. [1032]

* * * * *

The Court: You were about to pass to the phase of the witness' geologic cross-sections or geologic profiles I think just before lunch. You hadn't completed your statement, had you, on the matter of the description of the logs of the wells?

The Witness: Yes, in so far as the map is concerned.

The Court: Until you come to this phase?

The Witness: Yes.

The Court: Very well.

Mr. McPherson: May I make one suggestion for clarity and in no sense meaning cross examination or criticism. At or near the noon recess the witness referred to the overlapping cones between the San Joaquin and, I believe he said, Little Dry Creek.

The Court: Dry Creek.

Mr. McPherson: I wonder if it wouldn't be helpful if the witness in some fashion legended his exhibit 62 to show [1036] where that overlap occurs in his opinion at this time so it wouldn't be disassociated from his direct testimony on that subject.

The Court: You mean the area?

Mr. McPherson: Yes, your Honor.

The Court: Yes. I had rather understood him that it more or less overlapped from the San Joaquin over the entire Dry Creek cone.

Mr. McPherson: I just wanted to be certain that I understood him.

(Testimony of Charles H. Lee.)

The Court: Is that what you intended?

The Witness: I made no statement specifically. It has overlapped. How far, I——

The Court: You made no attempt to determine?

The Witness: I made no attempt to determine.

In drawing the legal description of the boundary of the cone in the vicinity of Fresno and within the area of Fresno I placed that boundary from one quarter to three-quarters of a mile south of the topographic boundary.

The Court: Of Dry Creek?

The Witness: That would encroach upon Dry Creek to the extent of one-quarter to three-quarters of a mile. But the Dry Creek cone at that point is two miles wide so that the encroachment did not cover the whole of Dry Creek.

The Court: That is, the Dry Creek cone in the vicinity [1037] of the city of Fresno?

The Witness: Yes.

The Court: Is two miles wide?

The Witness: About two miles wide.

The Court: Very well.

Q. (By Mr. Rowe): Mr. Lee, the location of Dry Creek roughly inside the city is, it crosses Highway 41 at Olive Avenue, it crosses North Broadway between Belmont and Divisadero and crosses North Fulton Street between Olive and Belmont. In other words, it comes quite a ways south into the center of town, is that not right, approximately?

(Testimony of Charles H. Lee.)

A. I am not familiar enough with the streets in the city of Fresno to follow your statement.

Q. You stated, Mr. Lee, you have well logs in Madera County, you also have other well logs, have you not, of Tranquillity, James Irrigation District and in western Fresno County? A. Yes.

Q. And considering those well logs also, do or do they not confirm your opinion so far as the location of the exterior boundaries of the alluvial cone as shown on Plaintiffs' Exhibit 30?

Mr. McPherson: We object, if the court please. There has been no foundation for that question. It will be necessary [1038] to show in the record affirmatively what the logs show before the witness could pull himself up by his own bootstraps.

The Court: I did not quite catch the point of the location of these logs of wells.

Q. (By Mr. Rowe): There are logs of wells you have studied in Madera County, have you not, Mr. Lee? A. Yes.

Q. And to determine the exterior boundaries of the alluvial cone of the San Joaquin River on the north?

A. One study which I have made to determine that boundary; yes. [1039]

Q. And you have also gathered logs in western Fresno County, in the vicinity of Fresno Slough, have you not? A. Yes.

The Court: North or south of the river—well, it would be south, naturally.

Mr. Rowe: South, yes.

(Testimony of Charles H. Lee.)

Q. (By Mr. Rowe): And you are making a collection of those logs, which will be available to opposing counsel and the engineers, are you not?

A. Yes.

Q. And your study of those logs, did that confirm or destroy your opinion as to the extent of the exterior boundary of the alluvial cone in the San Joaquin River?

Mr. McPherson: We object, if your Honor please; no proper foundation, purely argumentative. Certainly the well logs would have to be shown.

The Court: I think probably there is not sufficient foundation laid until the logs are made available.

Mr. Rowe: All right.

Q. (By Mr. Rowe): Mr. Lee, you also have some air pictures, aerial photographs, of the San Joaquin River between Friant and Mendota, have you not? A. Yes. [1040]

Mr. Rowe: In order to obtain these pictures, if the court please, from the United States Department of Agriculture, we had to state that they would not be used in a suit against the United States; and taking Mr. McPherson's own pleading, we replied that, as far as I knew, quoting the Justice Department, this was not a suit against the United States.

Mr. McPherson: Do you so stipulate, counsel?

Mr. Rowe: No, I don't. But I am offering these maps——

The Court: Last Friday morning you said, the

(Testimony of Charles H. Lee.)

very first thing when we opened court, that you agreed with Mr. McPherson that this was not a suit against the United States.

Mr. McPherson: That is my understanding of it, sir.

The Court: Don't you remember that?

Mr. Rowe: I will hold that in abeyance and let the court decide that, that being part of the court's province.

However, I am offering these maps on the theory of Mr. McPherson's that the United States is not here a party.

Mr. McPherson: Do you agree to that statement, counsel?

Mr. Rowe: I don't have to.

Mr. McPherson: Well, then, we object to the proffer of the documents.

Mr. Rowe: I could introduce them anyway, as far as that is concerned.

The Court: I don't know that the Department of Agriculture [1041] has any power to tell anybody and make them agree that they won't use material they have against the United States. It seems rather ridiculous to me that the Department of Agriculture, which is supposed to be a department of the Government and serve people of the United States, can produce material and data which are not available to them.

I can't see that any security measure is involved. I don't know that the Russians or Chinese Reds are coming over and profit from this.

(Testimony of Charles H. Lee.)

So, if there is any material in the courtroom at this moment, gathered by the Department of Agriculture, and any party desires it produced, I will order it produced.

Q. (By Mr. Rowe): Have you those maps?

A. Yes.

Q. Have you your copies that are marked by number? A. Yes.

(Witness produces maps.)

Mr. Rowe: Will you give that an exhibit number?

The Court: How many are there, do you know? Have you counted them?

The Witness: The numbers are on the back.

The Court: Are they numbered consecutively?

The Witness: Yes.

Mr. Rowe: There are 25 aerial photographs, numbered [1042] 1 to 25; and I ask that they be introduced as one exhibit.

The Court: 63 for identification.

(The exhibits referred to were marked Plaintiffs' Exhibit No. 63 for Identification, collectively.)

The Court: What are these; a series of separate photographs which have not been made into montage, I guess they call it?

The Witness: Yes. They are slightly overlapping, a series of photographs slightly overlapping.

Mr. McPherson: When were these taken, do you know?

(Testimony of Charles H. Lee.)

Mr. Rowe: It shows a date, 2/7/50. They are dated in the upper left-hand corner.

Mr. Goldberg: By whom were they made?

Mr. Rowe: By the United States Department of Agriculture. They were made by a local photographer, Mr. Lavalle.

Mr. McPherson: How many are there; 25?

Mr. Rowe: 25, yes.

Q. (By Mr. Rowe): Mr. Lee, are these maps numbered in order, starting with No. 1 at Mendota Pool?

A. Yes, they are, No. 1 at Mendota Pool, then going upstream.

The Court: To——

The Witness: Friant Dam.

The Court: And above? [1043]

The Witness: And a portion of Millerton Lake.

Q. (By Mr. Rowe): Friant Dam and a portion of Millerton Lake is marked 25? A. Yes.

Q. And they go by number from Mendota upstream? A. Yes.

Q. And do those maps—just what do they show? I mean, roughly, the San Joaquin River between Mendota Pool and Friant Dam?

A. Yes. They show the river, and the river bottoms, and a strip of land on either side beyond the bluffs, varying from half a mile to two, in some places, two or three miles.

Q. Mr. Lee, do any of those maps show the breakout of the ancient San Joaquin River from its present channel?

(Testimony of Charles H. Lee.)

Mr. McPherson: Are they numbered? What is the exhibit number?

Mr. Rowe: I will bring that in. If I could have them introduced as an exhibit, I would refer to them by number.

The Court: Exhibit 63 is admitted, photographs 1 to 25.

(The exhibit referred to was thereupon received in evidence and marked Plaintiffs' Exhibit No. 63.)

Q. (By Mr. Rowe): Mr. Lee, would you take the map where the Santa Fe Railroad crosses the San Joaquin River at a point upstream [1044] from Highway 99? Can you find that?

A. Yes, I have that. That is No. 15, marked on the back.

(Photograph handed to the Court.)

The Court: This says it was taken January 30, 1950.

Mr. Rowe: There were various dates.

The Court: In the early part of 1950?

Mr. Rowe: Yes.

Mr. McPherson: The whole county was flown as one operation, your Honor, and it took a series of days to do it.

The Court: I see.

Q. (By Mr. Rowe): The dates, Mr. Lee, as I understand, of these maps, are in the upper left-hand corner of each map?

A. That is my understanding.

Q. Is there anything on this part of Exhibit 63,

(Testimony of Charles H. Lee.)

sub 15, that indicates where the San Joaquin River, in its ancient days, may have jumped its banks?

A. Yes.

The Court: "Jumped its banks?" I understood his testimony to be that was the river, and after that it jumped both banks.

Q. (By Mr. Rowe): Will you tell what you see in that photograph, please? [1045]

Mr. McPherson: May I see what the witness is referring to, your Honor?

(Counsel examines photograph.) [1046]

Q. Withdrawing that question, Mr. Lee, does Plaintiffs' Exhibit 63 show at any place the ancient channels of the San Joaquin River?

A. It does. On Exhibit 63-15 there are indications——

The Court: Do you have another copy in front of you?

The Witness: No, your Honor. Counsel has it.

There are certain indications on this Exhibit 15——

The Court: Do counsel have a copy?

Mr. Rowe: I just couldn't afford to get too many. I will leave these with them.

Mr. McPherson: We have the whole thing mounted as a mosaic and we will offer it at the appropriate time, but I don't have them here now.

The Court: It would be helpful if it was all here.

Mr. McPherson: Yes, it would, if we were allowed to conduct the whole case for the plaintiff, I think.

(Testimony of Charles H. Lee.)

The Court: Well, if you have the map it would be particularly helpful at this moment. Maybe he does not want help all the time.

Mr. McPherson: We don't have it here.

The Court: When can you get it?

Mr. McPherson: We have the photographs and sent them up to have a mosaic made. It takes some time to do it. I don't know whether it is down from Sacramento or not. I haven't seen it. [1047]

The Court: Put it up on the board and explain it so the engineers or anybody who wants to — or does anybody else want to see it?

Mr. Reavis: I would like to see it. Put it up there.

The Witness: On this photograph——

The Court: That is the Santa Fe running diagonally, or is it Highway 99?

The Witness: The Santa Fe Railroad is shown across the center of the picture.

Q. (By Mr. Rowe): Would you mark that with the letter "A," the Santa Fe Railroad?

A. I am marking in orange with the letter "A" where it leaves the north edge of the map and also with the letter "A" on the southwest, for the Santa Fe Railroad.

The Court: Where is Highway 99?

The Witness: Highway 99 is shown in the southwest corner of the photograph alongside of and by the Southern Pacific Railroad, and I will mark that as "B" where it enters the photograph.

The Court: How far is it from the Santa Fe to

(Testimony of Charles H. Lee.)

Highway 99, the Southern Pacific, on the ground?

The Witness: About two miles.

The Court: And they run more or less parallel with one another and generally in a northwesterly, southeasterly direction? [1048]

The Witness: That is right.

I am also marking with "C" the point where the San Joaquin River leaves and enters the field of the photograph.

The photograph also shows the bottom lands of the San Joaquin River in the northeasterly part of the photograph, where the river itself is up against the bluffs on the Madera side, and then it swings across the bottoms and is up against the bluffs on the Fresno side, and that swing or S indicates the width of the bottoms at that point.

The bluffs on the north continue westerly from the point where the river leaves them and then the bluffs swing out.

The Court: Kind of in a semi-circle, is that it?

The Witness: In a semi-circle, and come back close to the river again just above the Santa Fe Railroad.

Now in that semi-circle beginning at the top of the bluff and extending northwesterly are a sort of ravine effect of light color having a continuous line extending in a northwesterly direction. There are several of those, the most easterly being in the vicinity of a point where the river leaves the northerly bluffs and starts the S bend, and there are others leaving the bluffs at a point westerly thereof indi-

(Testimony of Charles H. Lee.)

cating several channels at various times where by means of which the river left—or rather by which the [1049] river flowed out to the northwest before it had cut this deep valley.

The Court: Before the bluff was cut?

The Witness: Where the valley was cut down.

The Court: Where the bluff was cut?

The Witness: Where the bluff was cut.

The Court: Yes?

The Witness: The river, in other words, at that point, the channel was on the surface of the cone and if blocked in any direction it could flow out to the right or left around such a blockage, and it indicates that it flows out to the northwest there in several positions.

Q. (By Mr. Rowe): Would you mark those positions with the letters "OR," for old river?

A. I will mark it—there are others that flow to the west also. I will mark that.

The Court: I think you have described them sufficiently. I don't know how you are going to mark them.

Mr. Rowe: All right. Don't mark them.

The Court: They are alternate shades of light and dark color on the map.

The Witness: There is one position, the most westerly, which is quite a distinct channel.

The Court: There is one flowing northerly too.

The Witness: Most of them are northwesterly, and then swing around to the west. At the end of the half-circle there is one.

(Testimony of Charles H. Lee.)

The Court: What is that light shading there that seems to fan out?

The Witness: That is the alignment of one course the river took.

The Court: At one time?

The Witness: At one time.

The Court: Before the bluff was cut?

The Witness: Before the bluff was cut; yes.

The Court: Now was that not the point where you said the river took off to the south?

The Witness: That is shown on the photograph following downstream, another photograph.

Q. (By Mr. Rowe): Would you get that one?

The Court: Now in your opinion would this flow off to the north or northerly before it took off to the south?

The Witness: Yes. I haven't the photograph to the north, but the topography, the soil conditions, well logs and other indications are that after flowing northwesterly for some 5 miles the river then turned and flowed westerly and southwesterly and did not pass beyond the red line shown on the topographic maps. [1051]

The Court: The northerly red line?

The Witness: The northerly red line.

Now I haven't fully examined the well logs so as to determine whether or not there was some overlapping with the Cottonwood cone on the north but I have well logs which I examined showing the existence of cobbles within the 5-mile limit where the topography indicates that it turned.

(Testimony of Charles H. Lee.)

The Court: How far is Cottonwood Creek, the present bed of it, from the San Joaquin River on the north, about?

The Witness: From five to six miles.

The Court: Then your testimony is that it took this northerly takeoff before it got to what is the present bed of Cottonwood Creek and flowed back again southwesterly?

The Witness: That is right.

Q. (By Mr. Rowe): Mr. Lee, did you say the one into Madera County took off at an earlier time than the one that you are going to describe now south of Herndon?

The Court: He said it took off earlier.

Mr. Rowe: I didn't think you understood him.

The Witness: I didn't understand in time.

The Court: In point of time?

The Witness: I have no opinion on the point of time.

The Court: Very well.

The Witness: Whether it was before or after. It presumably [1052] was—well, it could be either way so far as time is concerned, but both were at the time the river was on a higher level and hadn't yet cut the bluffs.

Q. (By Mr. Rowe): Now would you show Herndon, and if it appears, indicate the blue line?

The Court: That is No. 14?

The Witness: It is No. 14, directly west to the one we were looking at.

The Court: Or westerly?

(Testimony of Charles H. Lee.)

The Witness: Westerly. And I will again mark the Santa Fe leaving and entering as "A," the Southern Pacific and Highway 99 as "B," and the San Joaquin River as "C."

Now on this photograph the Southern Pacific and Highway 99 cross the center from southeast to northwest, and the river crosses slightly southwesterly across the picture. The bluffs are again visible between the S bends of the river to a width of about a half mile or even three-quarters of a mile in some places.

Now on this photograph immediately west of the town of Herndon a channel or ravine is visible which follows a meandering course that I am now indicating with this pencil.

The Court: Which is the same one you marked in blue on Exhibit 30?

The Witness: It is the same one, yes, your Honor, and [1053] flowing generally southerly but it meanders.

The Court: Where does it take off from the river?

The Witness: As near as I can determine from the photograph, it takes off in the vicinity of the Pacific Gas & Electric Company substation, which is east of Highway 99 and north of Herndon, and then flows westerly and then southerly to the crossing of Highway 99 and thence on southerly as I just indicated.

The Court: Does that follow the little swale that is visible from the surface?

(Testimony of Charles H. Lee.)

The Witness: Yes, it does. It is quite a broad swale visible on the surface.

The Court: From the highway?

The Witness: Yes.

The Court: In other words, you go west of the highway and you encounter it at various places?

The Witness: Yes. This photograph also shows branches leaving the main swale and extending out to the west, whereas the main swale continues on to the south. [1054]

The Court: Does that show a continuation of the ancient flow, north, any map indications?

The Witness: It shows other branches leaving the river. There are shaded zones, light colored, leaving the edge of the bluff, which is upstream several hundred feet from the highway in a northwesterly direction, and then west of the highway there is a generally light colored shaded course extending in a northwesterly direction, indicative of points at which the river left its present location, the successive points along the edge of the present bluff.

Q. (By Mr. Rowe): Mr. Lee, does the——

The Court: Let me ask another question.

I understand from your testimony so far that the river, during the building of the ancient alluvial cone, flowed more or less—after building the ancient alluvial cone, in a well-defined channel to the vicinity of Herndon, then fanned out and began to flow one way, then another way, and built another cone?

The Witness: What I have termed the northern

(Testimony of Charles H. Lee.)

cone had its apex, in its broader phase, at Herndon. However, apparently there were two stages, that is, the deep valley in which the river now flows was cut to a far deeper level at one time. Possibly the well logs will indicate more than 60 feet. That is, the bottom of that valley is more [1055] than 60 feet below the present river level. And then subsequently it filled in again, and there may have been several cycles of that sort of thing, and it may have filled in as far up as Herndon, and then the river broke out because of the choking of its valley below Herndon.

The Court: As, for instance, this bluff north of the "S" on picture 15?

The Witness: Yes. If the valley became blocked and the river course was obstructed, in a narrow valley already cut, it then broke out on either side, and those courses, particularly those on the north, were cut fairly deep, as indicated by the occurrence of cobblestones to a depth of some 60 feet or more out to the north, a mile or two north of the bluff of the river; so that when it broke out of its valley at the subsequent stage, it scored quite deeply into the old cone, in forming a new narrow valley out to the northwest.

The history of the river, in connection with the building of the cone, has passed through a number of cycles.

The Court: Excuse me. Go ahead.

Q. (By Mr. Rowe): Mr. Lee, on the aerial

(Testimony of Charles H. Lee.)

photograph showing Pinedale, is there any indication of a breakout of the river?

The Court: By the way, on this picture 15, what is that heavy black line there? Is that a bluff, the [1056] southerly bluff, or is that a canal or road? There south of the river, the heavy black line.

The Witness: That apparently is the shadow of the time of day when the photograph was taken. It gives a darker appearance on the south side, because of the shadow.

On the north side, it isn't so much.

The Court: It might have been where the pictures were patched together. I see a little jog on each one of these.

The Witness: That jog on the edge is only on the margin. There is one on the side on all these pictures, on the margin, in the center; but the black line to which you refer is apparently the shadow of the bluff.

The Court: On the south side?

The Witness: On the south side, due to the position of the sun on the day the photograph was taken. It was taken January 30th, when the sun would be very low,——

The Court: Very well.

The Witness: ——so that that bluff would be in shadow.

The Court: Now, this is what picture?

The Witness: This is No. 17, showing Pinedale.

The Court: All right. Let's see No. 14 ther , that you have up on the board.

(Testimony of Charles H. Lee.)

(Photograph handed to the court.)

Q. (By Mr. Rowe): Mr. Lee, before showing Pinedale, and [1057] referring to 14, is the blue line that you drew this morning, running southerly from a point beginning near Herndon, is that visible on 14? A. Yes. I just described it.

Q. Will you point that out to the court?

The Court: He did. I can follow it.

The Witness: This is No. 17, and shows Pinedale on the center, right. I have marked with a "C" the point where the San Joaquin River enters the photograph on the northeast corner and where it leaves on the western margin.

The Court: Let's see now, where is Pinedale?

The Witness: Pinedale I marked with a "P."

The Court: Yes, I know where it is on that map, but Pinedale, where is it as far as Friant is concerned?

Mr. Rowe: It nearly comes up to Highway 41. It is out west. Highway 41 is across the river, New Lane's Bridge, a couple of miles.

The Court: Is New Lane's Bridge shown on that?

The Witness: New Lane's Bridge is not shown on here. It is about a mile or so to the east.

The Court: To the east?

The Witness: To the east.

Now, the width of the bottoms is shown on this photograph, as the river swings from bluff to bluff in making its bends, and the width of the bottoms at this point [1058] (indicating) is over a mile.

(Testimony of Charles H. Lee.)

Now, beginning on the south bluff west of Pinedale, there are lighter strips running toward the southwest from the bluff, a number of them, and parallel, which are indicative of old channels of the river reaching out in that direction.

The Court: Whereabouts, again, on that?

The Witness: They lie immediately west of Pinedale, commencing at the southerly bluff of the river,——

The Court: At the bottom of that "U"?

The Witness: At the bottom of that "U" and extending out to the southwest. Then the zones are shown, and appear as lighter streaks, arrow streaks.

The Court: And what does that indicate to you?

The Witness: That indicates to me the position of the old channels of the river.

The Court: That is a regular flow, or an occasional flow?

The Witness: An occasional flow, as it was built up.

The Court: Or a cyclical flow over a period of years?

The Witness: A cyclical flow over a period of years.

As the river built up, the river flows, first, away down the cone, then the other side, then down the center. It builds up in a series of changing courses, and channels, such as this, out to the southwest slope of the cone, rather [1059] than to the northwest.

The Court: This is in the area that you have

(Testimony of Charles H. Lee.)

described in your various maps and indicated to be above the modern alluvial cone and within the area of what you call the ancient alluvial cone?

The Witness: That is true.

The Court: Then, in your opinion, in point of time, the river flowed as you have described it from Pinedale before it took the flows that you described as emanating south from the point just above Herndon and one flowing north above the Santa Fe?

The Witness: Yes. The dimness of the appearance on this photograph is due to the fact of it being older, much older deposition.

The Court: Where is the south bluff of that river shown?

The Witness: The south bluff is shown where the shadow appears with the darker, thin ribbon line, which I am now showing, across the center of the picture.

The Court: And the north bluff?

The Witness: The north bluff, the lighter, thin ribbon across the northern edge of the picture.

The Court: Does the river flow back and forth between the bluffs? A. It does now.

The Court: It does now. When would you say, [1060] in comparatively recent times, that it has changed its course in between those bluffs?

The Witness: Yes. There are indications of old—of earlier channels in the bottoms themselves. In this "U", for example, there is an indication of an old channel which is still——

The Court: Straighter?

(Testimony of Charles H. Lee.)

The Witness: ——acting as a slough, on the high-water channel of the stream. It cuts across the "U". That is in the recent history of the river.

The Court: Go ahead, counsel.

Q. (By Mr. Rowe): Are there any other photographs of this series that you would like to point out to the court or generalize on?

The Court: Well, hand me that one, so I can look at it while your testimony is fresh in my mind.

(Photograph handed to the Court.)

Q. (By Mr. Rowe): Would you get the photograph showing the town of Biola?

A. I have it; No. 11.

The Court: Before going on to that, on your map 17, there are a number of dark lines south of the river, which, while they don't meander exactly, they sort of finger to the [1061] south and more or less generally parallel to the river.

What are they? Irrigation ditches?

The Witness: Those appear to be irrigation ditches. Some of them——

The Court; And they would indicate the slope is south from the river?

The Witness: Southwesterly.

The Court: Yes.

The Witness: Southwesterly.

The Court: And that is true on these other maps, too, that same kind of markings, as, for instance, on 15?

The Witness: Yes.

The Court: All right.

(Testimony of Charles H. Lee.)

The Witness: This photograph, which has been numbered 11, shows the town of Biola in the southeastern portion. It shows Skaggs Bridge at the western edge, just above the point where the river leaves the edge of the photograph, and I am marking that "C". [1062]

The Court: That is the river?

The Witness: That is the river and Skaggs Bridge is almost at that point.

I am also marking "C" where the river enters from the east, Biola, putting a "B" in the margin now for Biola.

In this photograph there are visible lines indicative of old channels of the river beyond the bluffs both to the northwest, several of them parallel, and further west, one being the east edge of the photograph; and also to the southwest which lie in generally parallel lines clear across the photograph, indicative of the fact that in the building up of this cone when the stream was at a higher level it sometimes flowed out to the northwest on the northwest flank of the cone and sometimes to the south on the southwest flank of its cone.

Q. (By Mr. Rowe): Are there any other photographs you would like to discuss in showing these ancient courses of the San Joaquin River?

A. These same features can be pointed out on other photographs. I think it would be merely duplication of what is already shown.

The Court: Where are the bluffs on Exhibit No. 11 at Biola, the north bluff? The north bluff does

(Testimony of Charles H. Lee.)

not widen out there and the bluff becomes very low. [1063]

The Witness: Further west of Biola it does. The north bluff is shown by a somewhat lighter zone just north of the river. The south bluff is a narrow ribbon of black, more so than on the previous photographs, but at Biola the river bottoms have not yet widened out.

It is true that the bluffs on the north side are not as sharp right in the center of this photograph as they are further east and further west on the north.

The Court: On the right side, that is the easterly side of this, the river bottom is very narrow?

The Witness: Yes.

The Court: It widens out here in the center to a mile or so wide?

The Witness: Not quite a mile; a little less than a mile.

The Court: And it is narrow at Skaggs Bridge?

The Witness: It is narrow at Skaggs Bridge.

The Court: Right between the bluffs?

The Witness: Yes.

The Court: And the place where you have indicated the flow went northerly and southerly is in what is here shown to be the wide portion of the bottom lands?

The Witness: Yes, but north of the north bluff and south of the south bluff. I am now indicating about the point where these channel indications

(Testimony of Charles H. Lee.)

commence and they are [1064] at the edge of the bluff. They do not traverse the bottom lands.

The Court: They do not traverse the bottom lands but they begin after the narrow bottom or narrow space between the bluffs and the easterly end and take off before it again reaches the narrow space between the bluffs on the westerly side?

The Witness: They are taking off at intervals.

The Court: Generally in that area?

The Witness: Generally in that area; yes. There are some even to the west but they are taking off at intervals in the full width of that picture.

The Court: Very well. We will have the afternoon recess.

(Short recess.)

The Court: Proceed, counsel.

Q. (By Mr. Rowe): Mr. Lee, you made a series of geologic profiles, did you not? A. Yes.

Q. The one begins near Friant and passes through Fresno. Have you that profile?

A. No. 4.

Q. Mr. Lee, showing you Plaintiffs' Exhibit 62, could you indicate on Plaintiffs' Exhibit 62 the red line that [1065] represents the profile?

A. Yes. There are four profiles.

Q. Is it numbered on Exhibit 62?

A. Exhibit 62 has the numbers 1, 2, 3 and 4.

Q. And this No. 4 you are discussing on Exhibit 62? A. There are all four shown.

The Court: You have all four on that one exhibit?

(Testimony of Charles H. Lee.)

The Witness: No, this is one exhibit, and this shows the well logs on the line called No. 4.

The Court: I understand. This is marked on this geologic profile No. 4, and it begins at well No. 155 and 162-B in the northeast section and runs southwesterly to Madison Avenue through a portion of the city of Fresno and ending at well No. 9, as near as I can figure out.

The Witness: Yes, your Honor.

(Counsel distributing maps.)

The Court: That will be Exhibit——

The Clerk: 64, your Honor.

The Court: No. 64.

(The map referred to was marked Plaintiffs' Exhibit No. 64 for identification.)

The Court: Had you offered these photographs in evidence?

Mr. Rowe: Yes. If I haven't, I offer them. I thought they were introduced. [1066]

The Court: They are admitted in evidence; No. 63 is in evidence.

The Court: And No. 64 for identification is a geologic profile No. 4 shown on Exhibit 62.

Mr. McPherson: Where would we find well 42 in Exhibit 54?

The Court: That is a well in the city of Fresno. I do not remember how Mr. Segel said they were numbered.

The Witness: Page 3.

Mr. Rowe: Page 3, the witness says.

Mr. McPherson: Thank you.

(Testimony of Charles H. Lee.)

Q. (By Mr. Rowe): Mr. Lee, showing you Plaintiffs' Exhibit 64—was that introduced?

The Court: It was marked for identification. Unless there is some objection, and presently there is no foundation, but it will be marked in evidence. It is admitted.

(The map referred to was received in evidence and marked Plaintiffs' Exhibit No. 64.)

Q. (By Mr. Rowe): Would you describe what that exhibit shows?

A. That exhibit shows a profile or cross-section of the San Joaquin River cone from a point below Friant southwesterly to a point just east of Kearney Park about three miles. [1067]

The scale vertically is 50 feet to the inch with elevations above sea level in feet, the caption on the left edge of the diagram showing the elevations.

Horizontally at the bottom is a scale of miles measured from the origin of the section which is three-tenths of a mile south of the northwest corner of Section 30, Township 11 South, Range 21 East.

Along the top of the diagram is an undulating line which indicates the surface of the ground. It begins in the river bottoms at the extreme left of the diagram, extends down the river bottoms for about three miles, and then rises precipitously at the bluff to the plains above, then continues to the right gently sloping downward to the extreme right of the diagram, sloping all the way and extending down the cone, representing the surface thereof.

(Testimony of Charles H. Lee.)

The Court: Then the left side of that is the upper side of the river, is that it?

The Witness: The left side is the river bottoms. It does not show the bluff on the north side but the left side for three miles is in the river bottoms.

The Court: Where is the line, the top line here?

The Witness: (Indicating.)

The Court: I see that, but where is it on this map?

The Witness: It is along the line of the red marked geologic profile No. 4. [1068]

The Court: Yes. How can it be in the river bottoms when that line does not cross the river bottoms?

The Witness: That line lies within the river bottoms for the first three miles. The bluffs are south of it for the first three miles. Then the bluffs cross at about three miles below the beginning as shown by a sudden rise in the ground surface.

The Court: Then the left side of this Exhibit No. 64 is the north end in so far as that surface line of your geologic profile No. 4 is concerned?

The Witness: Yes.

The Court: And the right side is the south line?

The Witness: The right side is the south line.

The Court: Very well. [1069]

The Witness: The ones at the top along the——

The Court: Copies have been distributed, I guess, to the various counsel and engineers and others?

Mr. Rowe: Yes.

The Court: How many copies did you distribute?

(Testimony of Charles H. Lee.)

Mr. Rowe: I said I would distribute one to the Government, one to the State, and one to the engineers.

The Court: All right.

Mr. Rowe: I mean one to the Districts; pardon me.

The Court: Very well.

Mr. Rowe: That is as much as we can afford.

The Witness: Along the top of the line indicating the surface of the ground are captions "Well No." so-and-so, at intervals.

The Court: All right. I see. Well No. 155,——

The Witness: The first one is Well No. 155; the second well is No. 15; the third, Well No. 114; then Well No. 180, Well No. 90, Well No. 89, the City of Fresno Well No. 42, then Well No. 181 and Well No. 9.

The Court: All right, 181 and Well No. 9 at the end?

The Witness: Yes.

The Court: You haven't put these other wells, Wells Nos. 6, 195, and 122, and 47, 114, that are adjacent but have no showing of cobbles?

The Witness: Some of them I have. I put wells at [1070] intervals, so as to make a sort of even distribution of wells along the line, but all of the well logs do not appear on this sheet.

The Court: All right.

The Witness: That is, those that are right on the line do, and some of those that are near the

(Testimony of Charles H. Lee.)

line, but not all of those that are not directly on the line and adjacent.

Many of those that are not shown on here are shallow, also; they do not go to any depth.

Q. (By Mr. Rowe): And the number of the wells on Plaintiffs' Exhibit 64 is the same number as shown on Plaintiffs' Exhibit 54, the well logs?

A. Yes; they are taken from Plaintiffs' Exhibit 54.

Q. You show an arrow on the right-hand side?

A. Yes. There is an arrow shown on the right-hand side, pointing to the surface of the ground line which is entitled "Topographic Boundaries, San Joaquin River Ancient Alluvial Cone."

Q. And that indicates the solid red meandering line on Plaintiffs' Exhibit 30? A. Yes.

Q. And the orange indicates what?

A. The orange coloring on this Exhibit 64 is indicative of the portion of the well logs which are shown [1071] graphically under each of the well numbers, which have cobbles, as indicated by the drillers' logs. The different strata, as shown on the drillers' logs, consist of sand, and clay, or sand and clay, and some sand and cobbles, and sand and soft clay, at intervals all the way down, different designations, and all those designations where cobbles are indicated on these logs they have been colored in orange.

Q. Now, what does the orange on each side of your arrow indicating the topographic boundary

(Testimony of Charles H. Lee.)

of the San Joaquin River ancient alluvial cone indicate?

The Court: I don't understand that question. I thought he just got through explaining that.

Mr. Rowe: I simply want to tie it in to the orange dots of the previous exhibit, showing the intermingling of the Little Dry Creek and the San Joaquin River.

Q. (By Mr. Rowe): In other words, the two orange shadings of Well No. 9 and Well No. 181, what does that indicate?

The Court: You mean there are two different shades of orange here?

Mr. Rowe: No; referring to the orange in Well No. 181 and in Well No. 9, what does that indicate?

The Witness: In both instances, it indicates that the log of those wells showed cobbles. Those cobbles, that is, the thickness of the stratum, in Well No. 181, in [1072] orange, is 20 feet, the log to that well indicating at that position coarse gray sand and pebbles were encountered.

In Well No. 9 there is only 5 feet indicated as cobbles.

Mr. McPherson: Did you use the expressions "coarse gray sand and pebbles" and "cobbles" interchangeably?

The Witness: That is one of the few instances where pebbles occurred, and I interpreted pebbles with cobbles. I think there are only two logs where the word "pebbles" appears. I have classed pebbles and cobbles.

(Testimony of Charles H. Lee.)

As the flow of the San Joaquin River would get out farther from the mouth of the canyon, the size of the pieces of rock carried would become smaller and smaller, as it gets out farther from the mountains, so in the scale of boulders, cobbles, pebbles, and gravel, pebbles would be the next smaller from cobbles.

The Court: Taking this cross-section and beginning with your Well No. 155, and having in mind what you have indicated in orange here as being the cobbles, does it show that cobbles are encountered at approximately the same depth in each well, or does it show a tendency or actually that the farther south you go the deeper you have to go to get to the cobbles? That is, the farther below sea level.

The Witness: It shows the—the top level of the cobbles from Well to Well shows a slope downward.

The Court: Downward?

The Witness: Downward.

The Court: You mean south?

The Witness: As one passes down the slope of the cone, or rather from the extreme north end of the section to the southern end, the top of the cobbles in the southern end are at lower levels, so there is a slope. A line could be drawn connecting up——

The Court: Here is Well No. 155, which is closest the river.

The Witness: Yes, your Honor; but Well No. 155 is in the recent bottoms of the river and recent formation, so that the cobbles in Well No. 155 are

(Testimony of Charles H. Lee.)

not necessarily indicative of the conditions beyond the bluff.

The Court: Then beginning at the bluff, the top of the cobbles is found at higher elevation above sea level than the cobble formation in each of the wells on this geological profile which lies southerly from there?

The Witness: Yes. In other words, the line connecting the top of the cobbles clear across this section would slope downward throughout, which is the condition at the surface. That is, the surface is downward, left to right, and the top of the cobbles is downward, left to right.

The Court: What conclusion can be drawn from the fact that your Well No. 9 has, what did you say, 5 feet [1074] only of cobbles?

The Witness: Yes.

The Court: And wells which lie northerly have a much wider formation or deeper, thicker formation rather? That that is the end of where it was deposited and something overlapped or——

The Witness: My conclusion from that is that the position of Well No. 9 is at the far extreme of any point at which the river extended at any time. There might have been at one time it extended out there, but the fact of there being just a slight showing of cobbles in that well, whereas all the other wells have a greater portion of cobbles, would indicate that the main portion of the cone of the river, as built up by the deposition of cobbles, lies farther up the slope than Well No. 9. [1075]

(Testimony of Charles H. Lee.)

The Court: In other words, the reason cobbles are not thicker there is because the river did not flow in such volume there as it did to the north?

The Witness: That is true. It may have flowed there once in its history. That well No. 9 is one of the five wells in the Dry Creek area which show cobbles, and there were only five there in the Dry Creek cone which shows cobbles, and that No. 9 is one of them.

The Court: Go ahead, counsel.

Q. (By Mr. Rowe): Mr. Lee, will you give the elevation of the cobbles at well No. 155 and the elevation in well 42 of the city of Fresno?

A. Well 155, the top of the stratum marked sand and cobbles is 310. I see there has been a narrow drafting area in the exhibit itself, the official exhibit, showing it at 300, but the correct figure should be 310.

The Court: Do you want to correct it now on the orange?

The Witness: Yes, I will correct it on the official exhibit up to 310.

The elevation now shows 310 at well 155 at the top of sand and cobbles.

In well 42 of the City of Fresno the top elevation of the stratum marked small cobbles is 204 feet above sea level. That is 106 feet lower. [1076]

Q. (By Mr. Rowe): Mr. Goldberg wanted to know why well 155, you indicated a sort of an open bottom with your orange, and that you have done

(Testimony of Charles H. Lee.)

that in some of the other wells. What does that indicate?

A. Well, most of these wells are open bottom, a great many of them, and——

The Court: You mean they end in cobbles?

The Witness: In sand or cobbles. Many of them end in sand, or sand and cobbles.

Mr. Goldberg: Mr. Lee, what does it mean when you have a solid line across the bottom, as well No. 15 and well No. 90, where you have solid lines across the bottom?

The Witness: I would have to check the log, the drafting work, because some I see are closed and some are not. I don't know whether that has any meaning or not. I would have to check the drafting against the original log. I don't think it means anything. It is just a variation in the draftsman's work.

Q. (By Mr. Rowe): Now, Mr. Lee, do the sand strata show a slope from the river downward toward the right of Plaintiffs' Exhibit 64?

The Court: From well 15 down or from well 155?

Mr. Rowe: Well 155 down to the right. [1077]

The Witness: Yes, there is a slope in the sand strata of a similar character to that in the cobble strata. There are variations in the thickness of the sand depending on its relative position with reference to the stream channel at any one time, because the bedding below the cobbles is not continuous apparently, it is intermittent, as one would

(Testimony of Charles H. Lee.)

expect from a stream building up its cone and flowing from side to side, sometimes down one side of the cone, sometimes down the other. The bedding is more continuous above the cobbles than it is below.

Q. (By Mr. Rowe): Is there anything else you want to say with regard to that profile that you think is important?

A. It might be pointed out that the bedding of the material above the cobbles varies from sand to clay and some hardpan.

The Court: What is hardpan?

The Witness: Hardpan is a name given to a deposit of clay, sand or silty clay which has hardened by cementation of some character, either calcareous or ferruginous, so it does become hard and impervious.

In general the depth of the bed above the cobbles is about 80 feet and it appears to be more continuous, the bedding above the cobbles, and presumably is that represented in the exposure in the bluffs on the edge of the river bottoms [1078] where bedding appears. It is obvious to the sight where one travels along the bottoms and at the base of the bluffs.

The Court: What are the water-producing zones, the cobbles?

The Witness: In some instances, the cobbles. The sands interbedded with the cobbles and below the cobble layers are usually more productive of water than the cobbles themselves.

(Testimony of Charles H. Lee.)

The Court: Immediately below the cobbles?

The Witness: Yes, in some cases, and in some cases below clay which is below the cobbles.

The Court: Below the clay?

The Witness: In some cases. There are clays intervening between the cobbles and the water-bearing sands.

The Court: How do you account for that, because the cobbles make more readily flowing aquifers?

The Witness: In some instances the cobbles in this area are open and permeable and form aquifers, in some instances the cobbles are deposited with the clays and silt and are not prolific aquifers.

As far as this profile is concerned, the cobble is more of a marker of the presence of the river. The cobbles require a river of competence to move them, a large river, one of high velocity, and the presence of cobbles shows that the river had been there at one time to deposit them. [1079]

In so far as the water-bearing qualities are concerned, experience in drilling wells has been that the uniform sand beds are more prolific of water than are the cobbles.

The Court: Which are those beds indicated here?

The Witness: At the bottom of many of these wells——

The Court: Let us take well No. 15, for example. You show the beginning of cobbles at an elevation of about 200—what is that?

The Witness: 269 feet.

(Testimony of Charles H. Lee.)

The Court: And then sand and cobbles with some clay in it down to 210 feet.

The Witness: Yes.

The Court: Then you have brown sandy clay for what, 30 feet, 20 feet?

The Witness: 10 feet.

The Court: Then again cobbles for 10 feet and then silty sand. Now would any of these be water-bearing?

The Witness: Presumably not.

Mr. Rowe: Which well is that?

The Court: Well No. 15.

Never?

The Witness: I have not the perforation record on this well.

The Court: Whether or not the well was perforated, would they be water-bearing? [1080]

The Witness: They do contain water, but whether that water would yield in sufficient quantity to produce an economic water supply, the perforation record would be more indicative of the condition.

All of these formations are saturated with water but it is usual to perforate a well only where the water is yielded freely into the foundation.

The Court: Do you know whether well No. 15 is perforated?

The Witness: No, I do not.

The Court: Would Exhibit 54 show?

The Witness: No.

(Testimony of Charles H. Lee.)

The Court: Where would that information be obtainable?

The Witness: From the driller.

The Court: Going down the well now here at 170 feet you again show cobbles for a distance of 70 feet, do you not?

The Witness: Yes, and much of that is sand and cobbles. It is possible that that bears water in sufficient quantity to warrant a perforation.

Many of these wells are what we call open bottom wells, that is, the water is drawn from the bottom, from the sand formation.

The Court: Without perforation?

The Witness: Without perforation.

Well No. 188 is an example. The bottom stratum there is water sand. And well No. 40 is rocks and sand. Well No. 90 [1081] is sand. Well 89 is cobbles and sand all at the bottom.

The Court: Now this well No. 42——

The Witness: The City of Fresno No. 42?

The Court: The City of Fresno No. 42, shows a closed bottom, or do you know?

The Witness: I do not know.

The Court: Do the City of Fresno show their perforations?

The Witness: It would be available, yes. I haven't it with me.

The Court: You do not have that?

The Witness: No.

Mr. Rowe: For the information of the court, this is under the heading the exterior boundaries of the

alluvial cone. We are proving that first. We are going to show how the water flows from the river later on.

Mr. Abercrombie: Or into the river.

The Court: What was that?

Mr. Abercrombie: Or into the river.

Mr. Green: Could I ask a question of Mr. Lee before Mr. Rowe continues?

Voir Dire Examination

Q. (By Mr. Green): Mr. Lee, what is a cobble, how big is it?

A. Well, there is a scale of sizes that can be used. [1082] There are different scales but the one I used, pebbles from 16 hundredths of an inch to 2½ inches, cobbles from 2½ inches to 10 inches, and boulders greater than 10 inches.

Q. Is that a standard scale?

A. That is one standard.

Q. Is it the same standard that these well drillers used in their logs, or do you know?

Mr. Rowe: I object to that. I am putting on the direct evidence.

Mr. Green: I think it goes to the foundation, your Honor.

The Court: Yes, I think it goes to the foundation.

Q. (By Mr. Green): Can you answer that, Mr. Lee?

A. It was my understanding that that is about the range that the well drillers use in their notations in logs. [1083]

* * * * *

(Testimony of Charles H. Lee.)

Direct Examination —(Continued)

Mr. Rowe: That is all on this exhibit.

Q. Have you another profile? A. Yes.

The Court: If No. 64 has not been marked in evidence, it is now admitted.

Q. (By Mr. Rowe): Do you have one along Braley Avenue referred to as geologic profile No. 1 in the previous exhibit with the red lines?

A. Yes.

(Counsel distributing documents.) [1084]

Mr. Rowe: May I have this marked Exhibit 65 for the purposes of identification?

The Court: 65. This is profile No. 1?

Mr. Rowe: No. 1.

(The document referred to was thereupon marked Plaintiffs' Exhibit No. 65 for identification.)

The Court: This is the same general scheme on the top line here; is that right?

The Witness: Yes; the same general scheme exactly, except that it shows the full width of the river bottoms on the left, because of the fact that the section crosses the river at right angles.

The Court: Oh. I see. All right. Then do you show the north bluff of the river?

The Witness: Yes.

The Court: On the left?

The Witness: Yes. This is what might be termed a transverse profile, as compared with longitudinal. No. 4 was a longitudinal profile.

(Testimony of Charles H. Lee.)

Q. (By Mr. Rowe): Mr. Lee, will you explain this Exhibit No. 65 for identification?

A. It is similar to Exhibit 64, and shows wells, as did the other locations, and graphically the logs. It shows the river bottoms of the San Joaquin River on the left, [1085] the bluff on the north and south sides, and over on the right the arrow points again to the topographic boundary of the San Joaquin River ancient alluvial cone.

Q. And this is similar to the previous profile, Exhibit No. 64, is it not? A. Yes.

Q. And is it shown as a red line on the orange-dotted exhibit—is that Exhibit 63, your Honor?

The Court: 62.

The Witness: 62. Yes, it is shown as a red line on Exhibit 62.

The Court: Why did you leave Well No. 182 off of it? That seems to be right on the line.

The Witness: Many of these logs came after the sections were prepared and that particular one——

Mr. McPherson: I thought these were all prepared from the logs offered by the City, except 54.

Mr. Rowe: That came in very late. We couldn't have it earlier.

The Witness: I think that was one that came in later than the others, and the sections were prepared.

The Court: All right.

The Witness: It was not put on the sections.

The Court: All right. Go ahead, counsel. [1086]

Q. (By Mr. Rowe): Now, the previous exhibit,

(Testimony of Charles H. Lee.)

64, going back to that for one minute, where was the well in the river bottom located, roughly?

The Court: Where was the what?

Mr. Rowe: The well in the river bottom.

The Witness: On Exhibit 65?

Mr. Rowe: 64. I forgot to ask about that. That is well No. 155. I am just trying to tie these in.

The Court: Well, he says three-tenths of a mile south of the northwest quarter of Section 30, Township 11 South, Range 21 East.

Mr. Rowe: I was going to tie it in with one of the ranchers' properties.

The Court: Whose ranch?

Q. (By Mr. Rowe): Whose ranch was Well No. 155 located on, if you know?

A. I do not know offhand. I could check it up.

The Court: Well, roughly, say from the Rank property, Rank Island?

I will withdraw that question.

It appears to be way above there. It is at the end of Willow Avenue, wherever that is.

The Witness: The owner's name is reported as H. C. Diehl, D-i-e-h-l.

Mr. Rowe: I will withdraw that question. The court [1087] has it located.

I am going to offer the profile as Exhibit No. 65 in evidence.

The Court: It is admitted.

Mr. McPherson: Just a minute, if your Honor please.

For what purpose?

(Testimony of Charles H. Lee.)

Mr. Rowe: Showing the extent and depth of these bottoms, and the location of the sand in the various wells.

In other words, it is just another profile along the red lines, indicated as red lines on Exhibit 62.

Mr. McPherson: We object to this exhibit on the ground there has been no proper foundation laid.

Mr. Rowe: All right.

Q. (By Mr. Rowe): Mr. Lee, would you describe the sand strata in the various wells on Exhibit 65?

A. In Well No. 25, there was 15 feet of top soil, and then cobbles and sand, 39 feet thickness of strata, below which is clay, gray sand, packed red clay, and finally water-sand in the bottom.

The Court: That says "Sand," then in parenthesis, "Water." Water sand?

The Witness: That was the notation on the driller's log.

The Court: All right. [1088]

The Witness: That Well No. 25 is in the river bottoms.

Well No. 181 is beyond the bluffs; and that has a series of clay, sand, and clay strata, down to the cobbles at elevation two eighteen; and the lower portion of the well is all in cobbles.

Mr. McPherson: With respect to that well, Mr. Lee, what does the legend "Medium Red C-e-m" stand for? What does "C-e-m" stand for?

The Witness: "C-e-m" means cemented.

The Court: Where is that?

(Testimony of Charles H. Lee.)

The Witness: About half way down the log. "Medium Red Cemented Sand" is the full meaning.

The Court: By the way, I notice here you have got your topographic boundary San Joaquin River ancient alluvial cone lying northerly of Well 68, and on Exhibit 62 it lies between Well 68 and Well 209.

The Witness: Well, that is the way it appears.

The Court: Well, which do you wish your testimony to be?

The Witness: I will have to check that up. It is a drafting difference of a minor character, and I would have to check it up to be exact.

Mr. McPherson: Are you through now? I want to ask another question.

Mr. Rowe: An attorney would blame it on his stenographer. [1089]

Mr. McPherson: On Well No. 180, I also notice "Red and gray sand and gravel," which you do not show in yellow.

Is that a different formation?

The Court: Does not show what?

Mr. McPherson: Well No. 180, the third legend down, is the expression "Red and gray sand and gravel." I wondered if that was a different formation than the one colored in yellow on Exhibit 64, using the expression "Gravel."

The Witness: No; it was intended that there be no gravel marked. The cobbles were what were to be marked in [illegible]ge.

(Testimony of Charles H. Lee.)

The Court: No, there isn't any gravel marked in orange here. This just says "Red and gray sand and gravel."

The Witness: No, there was no gravel marked in orange, that I know of.

Mr. Goldberg: In Well No. 205, you have "Small rocks and gravel."

The Witness: I interpreted "Small rocks" to be something larger than gravel.

Mr. McPherson: That is what I was trying to get at.

The Witness: Rocks are usually two or three or four or five feet across. A small rock might be a foot across.

The Court: By "Small rocks and gravel," you mean——

The Witness: I interpreted a small rock to be something in the cobble range. [1090]

* * * * *

The Court: By the way, Mr. Rowe, or Mr. Green, I think, suggested that Mr. Lee might mark along Exhibit No. 30 the various courses of what his opinion is as to the San Joaquin River in the past, overnight. So, if it is agreeable, I will now release Exhibit No. 30 to Mr. Lee for that purpose.

You may take it, Mr. Lee. [1091]

* * * * *

The Court: Exhibit 30 has now been placed on the easel and Mr. Lee has had it out overnight.

(Testimony of Charles H. Lee.)

Direct Examination—(Continued)

The Court: And have you placed on Exhibit 30 in blue—was it in blue?

The Witness: Solid blue lines. [1097]

* * * * *

Q. (By Mr. Rowe): Mr. Lee, would these blue lines be illustrative of what happened during the upbuilding of the San Joaquin alluvial cone?

A. Yes. Those were the final stages and they are representative of the method of building up of the cone at lower levels, a progressive building up from time to time, and these channels indicated on the surface are duplicated below with various modifications in direction and branching so that there is a superposition one on top of the other of channels and of deposits of the various branches of the stream in the process of the building up of the cone.

Q. Now these blue lines are the last meanderings of the San Joaquin River from its present channel, is that right? A. Yes.

Q. Now are there other channels that do not appear now on the surface where the San Joaquin meandered in ancient times? [1129]

A. Yes, at lower levels there are similar channels.

In saying the "last" channels, that is, they are the channels that are visible on the surface. Of course there was difference in time in the development of these various channels which are now on

(Testimony of Charles H. Lee.)

the surface, but as I understood the question "last" referred to last in vertical position, not last in time.

Q. Now underneath the channels indicated by the blue lines where the San Joaquin River meandered, are there other ancient channels of the river where it meandered as it came out of the mountains?

A. In my opinion there are and the well logs indicate that there are.

The Court: Do they necessarily flow in the same location that these blue lines indicate?

A. No. There are continued and progressive modifications. As the stream would deposit debris, the course of the stream would be deflected and there is continual branching and re-branching and as subsequent debris was deposited on old channels the course of the newer channels at higher level would be different, that is, different in detail. There might be a general location followed, but a difference in detail. [1130]

* * * * *

Q. (By Mr. Rowe): In other words, under the blue lines and within the boundaries of the alluvial cone are other ancient channels of the San Joaquin River? [1131] A. Yes. [1132]

* * * * *

Q. (By Mr. Rowe): Mr. Lee, did you make certain well studies inside the alluvial cone and bordering the San Joaquin River?

Mr. Abercrombie: Asked and answered, if the court please.

The Court: Overruled.

The Witness: Yes. [1134] * * * * *

(Testimony of Charles H. Lee.)

The Witness: The upper portion of cones or alluvial sands where the grade is steeper as the stream leaves the mountains, the deposits are of a coarser character and somewhat more permeable. Further down the cone the finer materials are deposited. The middle and lower portions of cones, particularly the lower portions, the deposition of the finer materials on there forms beds, particularly where there is ponding or lake conditions. And these beds are relatively impermeable but are interbedded with the permeable sands and sometimes gravels which are deposited on top of the impermeable beds at subsequent dates so that in the middle and lower portions of cones there are interbedded permeable materials and impermeable materials, the permeable materials extending back up into the head of the cone and feeding therefrom. The water therefore in percolating down a cone through the permeable materials in the upper portion and passing beneath impermeable materials or beds becomes what is known as confined, and the impermeable bed above it confines it so that when a well is drilled puncturing the clay bed the water rises above the bottom of that clay bed to a higher level, not necessarily flows out the surface but it has a pressure and it rises above the bottom of that confining bed.

When I speak of portions of a cone having pressure conditions, I speak generally of the middle and lower portions [1144] of the cones.

(Testimony of Charles H. Lee.)

The Court: Is that the same principle as putting a nozzle on the end of a hose?

The Witness: Yes, your Honor. If the nozzle is completely closed there is pressure in the hose, if the nozzle is opened there is a rise of that water, and if the hose is held straight up it will rise above the nozzle. [1145]

* * * * *

The Witness: Well, in the aquifers the pressure is not lost, only partially lost. In the aquifers it would be completely lost. But where there is an aquifer the water creeps into, then the aquifer is being more permeable and is confined [1152] by the less permeable materials around it, and it forms a tube so that it developed pressure in that way. The aquifer, in other words, forms an underground tube.

The Court: It performs the same function as a tube?

The Witness: Yes. [1153]

* * * * *

The Court: All right.

Q. (By Mr. Rowe): Does that depend on the size of the grain, Mr. Lee?

The Court: Type and size.

Mr. Rowe: Type and size.

The Witness: The volume of water that would absorb without increasing in volume would depend on the size, the gradation in size, the shape of the grain, and the degree of pitting together, and one or two other items.

(Testimony of Charles H. Lee.)

The Court: Ordinary building sand, used in building, I don't suppose the specifications there are too accurate as to the size of the grain of sand?

The Witness: It would run about a third.

Q. (By Mr. Rowe): Mr. Lee, what is the greatest rise from the bottom of the San Joaquin River at Herndon, under high water, in feet, above the bottom of the river?

Mr. Abercrombie: I object to that. What does he mean by "high water in feet"?

The Court: Sustained.

Are you going to skip the rest of the geologic profiles?

Mr. Rowe: I will bring those on.

Q. Do you have some other geologic profiles?

A. Yes.

Mr. Green: Before these are introduced, if the court [1158] please, can we have a definition of "geologic profiles"?

The Court: Exhibits 64 and 65 are pictures of them.

Mr. Green: That is the point I want to understand. They don't have any normal what you call profile, underground profile, lines in them. All they are are the schematic scale diagram of logs of wells.

I mean, generally, as I understand, a geologic profile would show the curvatures and the variations of the various strata of various types of earth.

The Court: Well, let me suggest that without, possibly, going into any scientific definition, that

(Testimony of Charles H. Lee.)

Exhibits 64 and 65 illustrates what the witness referred to on Exhibit 62 as a geologic profile.

Mr. Green: I would like to know what he means by that.

The Court: That is what he means. Even though he doesn't mean the usual geologic profile, where you see all these things carried across solid.

Mr. Green: Is that correct, Mr. Lee?

The Witness: Well, the exhibit speaks for itself.

The strata could have been hypothetically segregated into various layers, and the exhibit, as it is prepared, is a factual exhibit. It sets up the logs of the wells, and anything further would be somewhat hypothetical.

Mr. Green: In other words, you don't intend to presume, by Exhibit 64, that there is any connection, for example, [1159] between the cobbles in Well 15 and the cobbles in Well 140; all you were showing is that there are cobbles in Well 15 and are cobbles in Well 140; is that correct?

The Witness: Yes; and I conclude therefrom——

The Court: That there is a connection?

The Witness: ——that because of the cobbles being in all the successive wells until you get to the edge of the cone, and extending to the well nearest the mouth of the canyon, that there are more or less continuous deposits of cobbles, with greater and lesser thickness, depending on the adjacency of the channels of the river, one above the other, and the occurrence at all of channels.

(Testimony of Charles H. Lee.)

In some places a well with gravel at the side does not show gravel.

In other words, the channels or aquifers were not penetrated, containing gravel at that particular point.

Mr. Abercrombie: If the court please, we move there be stricken from Plaintiffs' Exhibit 2 the designation "Line of geographic profile," and that there be substituted "Typical profile of parts of well logs."

The Court: Motion denied. We all know what this map is about.

Mr. Abercrombie: The map introduced in the record shows it represents a geological profile.

The Court: Here it is introduced so anybody reviewing [1160] the record can see what is referred to by that.

Mr. Lee, in making a geological profile, is it customary that the geologist, or the person making it up under his supervision, take certain identified zones or areas and hypothetically project that between them, or do they go along in the ground like a worm and follow it through?

The Witness: It is done both ways.

The Court: I mean underground.

The Witness: It is not done underground except in certain portions of India. I believe there they do go down deep and burrow great depths in penetrating aquifers for the water supply there.

The Court: For instance, oil well logs and geologic cross-sections, they go three or four or five

(Testimony of Charles H. Lee.)

or eight thousand feet deep, and they take isolated drillings and fill in hypothetically from point to point?

The Witness: That is right. That is what is done here, and testimony has been and probably will later on be given to show that.

But as far as the drawings here are concerned, they represent logs of wells set up side by side, within the proper distance between, showing the vertical elevation and types of formation.

Q. (By Mr. Rowe): And show the surface of the ground above the well? [1161]

A. Yes.

The Court: In your experience as an engineer, would you draw any conclusion with relation to Exhibit 64, as to whether or not the formations shown as sand and cobbles in Well No. 15 and the intervening wells between that and Well No. 181 were in the same geologic strata, and continuous from Well No. 15 to Well No. 181?

The Witness: Yes, I would form conclusions from that.

The Court: What conclusion would you form?

The Witness: I would form this conclusion: that from the surface down for some——

The Court: Well, would you form the conclusion that they were continuous?

The Witness: Yes.

The Court: In between these points indicated on this map?

The Witness: Yes, absolutely.

(Testimony of Charles H. Lee.)

The Court: All right.

The Witness: With the modification of the eccentricities of occurrence of the various channels. But the first hundred feet indicates continuous bedding, more continuous bedding than any other portion of the location.

The Court: Well, below the first 100 feet you find variations?

The Witness: There appear to be variations below that. [1162] The cobbles are greater and lesser extent vertically, and the interspersing of clay or sand between cobble deposits is irregular.

The Court: That is, irregular as between the wells?

The Witness: As between the wells, yes.

The Court: All right.

Mr. Rowe: Before leaving this and before I forget it, occasionally the figures 17, 18 and 19 were used without the letter "L," L-17, L-18 and L-19, in reference to the blue lines on Plaintiffs' Exhibit 30; and I want to clear that up.

Q. (By Mr. Rowe): Mr. Lee, when you refer to "17," "18," or "19," if you did, without the letter "L," in regard to the blue lines on Exhibit 30, you were referring to L-17, L-18, and L-19?

A. Yes, always.

Q. Now, have you this next profile?

A. Yes, I have profile No. 2 in front of me. There are eight copies here.

Mr. Rowe: May I ask that that have a number, please, for purposes of identification?

(Testimony of Charles H. Lee.)

The Clerk: 66.

(The document was thereupon marked Plaintiffs' Exhibit No. 66 for identification.) [1163]

Q. (By Mr. Rowe): Mr. Lee, will you explain Plaintiffs' Exhibit 66 for the purposes of identification?

A. Exhibit 66 is a vertical section entitled "Geologic Profile No. 2," extending from the San Joaquin River bottoms directly north of the City of Fresno, southerly through the City of Fresno and just beyond the Southern Pacific Railroad.

Upon this profile, as upon the previous profiles that have been introduced, is shown, in vertical, the elevation of the sealevel in feet, 50 feet to the inch, and horizontally the distance from the center of the river channel, in miles, 2 inches to the mile.

Upon this profile have been shown graphically the surface of the ground along that line, the bottoms of the San Joaquin River and the channel of the river, as appearing as a depression in the line toward the left; and beyond the bottoms, the open plains are shown as a sloping line from left to right.

Wells are shown by number, as before in the other exhibits.

Also the character of material encountered, as shown by the well logs, with an orange coloring placed upon the strata, showing cobbles.

These orange colorings appear in all of the wells beginning with the river bottoms, and those under the plains [1164] adjacent thereto, and including Fresno City Well No. 42.

(Testimony of Charles H. Lee.)

The next well, Fresno City Well No. 31, is right at the topographic boundary of the cone, and that does not show cobbles. Neither do the wells south of the boundary of the topographic cone show cobbles.

The conclusion which I draw therefrom is that the cobbles are deposited in a region which was traversed at one time by a stream competent to carry cobbles, and that these deposits were made from such stream, the extent of the cobbles appearing in any one well being dependent upon the continued position of that stream at one location.

If the stream was in that same location for some considerable period of time, depositing, the extent of the stratum would be much greater than where it was just one flood flow with deposition just once and then not subsequently.

It is to be noted that the level of the top of the cobbles, as they appear in the wells that are beneath the plains beyond the river bottoms, is roughly at about the same level, within 20 or 30 feet.

The profile, it will be noted in that connection, is more nearly transverse or across the cone, rather than up and down the cone as was profile No. 4. This profile then shows more a cross-section of the cone from side to side, whereas No. 4 was a lengthwise profile of the cone.

This exhibit, in addition to the showing of cobbles, [1165] shows above the cobbles deposits of sand and clay and, in one instance, No. 90, there is some gravel at a level above the cobbles, but the others show only sand and clay, and suggest deposi-

(Testimony of Charles H. Lee.)

tion of debris under conditions such that cobbles could not be carried, possibly a different source of material.

There was great volcanic activity at one time in the Sierra slopes, and some of these logs indicate volcanic debris of somewhat fine texture, and the volume of that debris may have been too great to permit the flow of the stream out across the area in large volume, so that deposition of the cobbles took place at the head of the cone, or at some point lower down, if an incision at that time had been cut in the cone. [1166]

Q. Mr. Lee, what is the difference in elevation between the bottom of the cobbles in well 116 and the bottom of the cobbles in City's well No. 42?

A. About 210 feet lower in well 42.

Q. And did I understand you to say that ordinarily water sand is below the cobbles?

A. In a number of instances. In well 90 and 188, 89, there are sands below the cobbles and the general practice in portions of this area are to draw from open bottom wells which penetrate to the sands which are found below the first cobble layers.

Q. What is the difference in elevation between the first sand in well No. 116 below the cobbles and the first sand in well No. 42 of the City of Fresno below the cobbles?

The Court: Well, it is 50 feet, according to the map, between well 116 and well 42.

The Witness: 143 feet, your Honor.

The Court: The top of the sand?

(Testimony of Charles H. Lee.)

The Witness: I think the well was 42 and not 142.

The Court: I beg your pardon.

Mr. McPherson: May I ask the witness a question about terminology?

The Court: Well 142? —

Mr. Rowe: Well 42.

The Court: Well, well No. 42 shows the top of the [4167] cobbles to be 200 feet and well No. 116 shows the top of the cobbles to be 250 feet; 200 from 250 is 50, so there is a 50-foot difference.

Mr. Rowe: I thought I asked the witness what is the difference in elevation between the first sand below the cobbles in well 116 and the first sand below the cobbles in well 42.

The Court: I beg your pardon. Go ahead.

The Witness: I think the answer is in the record.

The Court: No, not that one. The first sand below the cobbles in well 116 is what, 200 feet?

The Witness: 143 feet, to be exact.

Mr. McPherson: May I ask the witness the meaning of a word which appears on his map?

The Court: Yes.

Mr. McPherson: I direct your attention to the entry reflecting the log of well 142 and the log of well 42 of the City of Fresno, about half way down on the first well you show marked as cobbles an area legend, sand and float rock, and a like entry about half way down as to well 42. What is the significance of the term "float rock"?

(Testimony of Charles H. Lee.)

The Witness: Float rock has been explained by the drillers to mean rock which floats.

Mr. McPherson: Would you mean by that that it is synonymous with your entry "cobbles" elsewhere on the map? [1168]

The Witness: Simply in size, maybe not in weight.

The Court: In some places you call them cobbles and in some places sand and float rock and sand and gravel, sand, clay and cobbles. Wherever you have orange here that should be cobbles?

The Witness: Yes. I notice in the well that Mr. McPherson just referred to, No. 142, that there is a zone marked sand and gravel and that should be eliminated.

The Court: It is sand and float rock he is talking about.

The Witness: Well, I think he referred to sand and gravel also.

* * * * *

Q. (By Mr. Rowe): Mr. Lee, where does geologic profile No. 2 intersect the San Joaquin Valley?

A. Immediately north of the manufacturing portion of Pinedale.

The Court: Is that in the vicinity of one of the takeoffs [1169] of one of the L-streams?

The Witness: Yes. It is just upstream a short distance from the takeoff of L-25 to which I am now indicating, which is on the Fresno North Quadrangle. The position of this profile No. 2 is on

(Testimony of Charles H. Lee.)

Palm Avenue, which I am now indicating with a pencil.

The Court: Now one of the L streams crosses this profile, does it not?

The Witness: It does; L-21.

The Court: L-21?

The Witness: Yes.

The Court: At what point on Exhibit 66 would that be?

Mr. Green: I think you will find it one-half mile south of well 188, your Honor.

Mr. Abercrombie: It is the west quarter corner section of Section 4, I believe.

The Witness: It would be very close to well 188.

Mr. Green: Half a mile south of well 188, isn't it? Doesn't L-21 leave Section 4 at the west—well, actually it is about in the half section line running from east to west through the section.

Mr. Rowe: About a half a mile.

The Court: I cannot see it from there. What does that map show?

Mr. Ingerson: Do you mean me? [1170]

The Court: Anybody.

Mr. Ingerson: Your Honor, it is the west quarter corner of Section 4, Township 13 South.

The Court: Palm Avenue?

Mr. Ingerson: On Palm Avenue, that is correct; otherwise the intersection of Palm Avenue and Sierra Avenue.

The Court: That is very close to well 188?

Mr. Green: Half a mile south of it.

(Testimony of Charles H. Lee.)

The Court: What is close?

The Witness: I thought that I had the exact location of 188 on the detail topographic map, but I do not find it. Judging from Exhibit No. 62, well 188 lies a half mile north of the position of L-21.

The Court: Then that would be about midway between well No. 88 and well No. 90 as shown on Exhibit 66?

The Witness: Yes, your Honor; that is right.

The Court: Did you make any geologic profiles following the line or lines of any of the what, for lack of a better name, we shall call L streams?

The Witness: No. [1171]

* * * * *

Mr. Goldberg: Mr. Lee, what is meant by the term "water sand" that is referred to in here?

The Court: Well, it is repeatedly referred to in all of these. I suppose somebody is going to get around to that without me having to ask for it.

Mr. Goldberg: We are now around to it.

Mr. Abercrombie: We assumed you knew that, your Honor.

The Court: That was where you went too far.

The Witness: The term "water sand" is one used by drillers to describe a sand in which there is a free flow of water, such as would provide an economic supply of water for pumping. [1175]

* * * * *

Q. (By Mr. Rowe): Mr. Lee, would you explain Plaintiffs' Exhibit No. 67 for the purposes of identification?

(Testimony of Charles H. Lee.)

A. Plaintiffs' Exhibit No. 67 is similar in its scale and arrangement to the preceding exhibits. It shows the profile of formations, as disclosed by well logs, from a point near the San Joaquin River in Section 30, the northeast corner of Section 30, Township 11 South, Range 21 East, extending southerly to a point directly east of the center of the City of Fresno at McKinley Avenue. [1190]

* * * * *

The Court: Objection overruled.

The Witness: My conclusion is that the aquifers in the material under the bluffs do extend through to contact with the permeable material in the river bottoms.

Q. (By Mr. Rowe): And is that condition, in your opinion, general where the bluffs exist all along the San Joaquin River?

Mr. Green: Objected to, leading and suggestive.

The Court: Overruled.

The Witness: Yes,—— [1224]

* * * * *

The Court: Very well. That will be marked for identification as No. 70, I guess is the next number, Mr. Clerk?

The Clerk: No. 70 will be the next number.

(The document referred to was marked Plaintiffs' Exhibit No. 70 for identification.)

* * * * *

The Court: So that at Sample Ranch Gaging Station at 16,000 second-feet the water level was 15.4 higher than zero?

(Testimony of Charles H. Lee.)

The Witness: Yes. And at an instantaneous discharge of 77,200 second feet in December, December 11, 1937, it was greater than that.

The Court: How much greater?

The Witness: I have not those figures for all of the stations.

The Court: What station do you have?

The Witness: I have one at Riverview.

The Court: What was the depth of the water there?

The Witness: At the maximum it was 18.3 feet.

At Herndon it was 23.5 feet.

At Bowser Station is was 24.5 feet.

At Skaggs Bridge it was 21 feet.

Mr. Green: What time of the year was this?

The Court: He said it was December 10th.

The Witness: December 11, 1937.

Mr. McPherson: What was Skaggs Bridge? I missed that.

The Witness: 21 feet. [1234]

* * * * *

Q. (By Mr. Rowe): Mr. Lee, do you have a series of charts or graphs showing water levels at various State river gages and water levels in wells, have you not?

A. Yes, those wells being the wells observed by the plaintiff.

The Court: In other words, you have charted the wells and the stations that you have indicated in the other exhibit?

The Witness: Yes.

(Testimony of Charles H. Lee.)

Q. (By Mr. Rowe): As against the level in the river, various levels? A. Yes.

Mr. Rowe: I ask that this be marked for identification Plaintiffs' Exhibit 71.

The Court: No. 71, and you will furnish copies to other counsel?

Mr. Rowe: Yes.

The Court: Chart of the wells and stations on Exhibit [1241] 69?

The Witness: As observed by the plaintiff.

The Court: As observed by the plaintiff?

The Witness: Yes.

(The document referred to was marked Plaintiffs' Exhibit No. 71 for identification.)

Mr. Goldberg: Where does it indicate that these observations are by the plaintiff? It indicates on the face of it that the observations were by the Peerless Pump Company.

Mr. Rowe: Well, their engineer acting under Mr. Lee's direction took over the well measurements.

The Court: Is that correct, Mr. Lee, these were done under your direction?

The Witness: Yes. The work was under my direction and the actual physical work of going out and measuring was done by the Peerless Pump Company, one of their men was assigned to it.

The Court: What is his name?

The Witness: Harvey Page up until about three weeks ago.

The Court: Then after that?

(Testimony of Charles H. Lee.)

The Witness: I don't know the name of the man after that. It is known by Peerless. [1242]

Q. (By Mr. Rowe): Did he work under your direction and he took wells that you directed him to take, the measurement of wells?

A. Yes, I selected the list of wells and took him to the sites of different wells and he observed those and subsequently weekly. [1243]

* * * * *

Mr. Rowe: North of the river is the farthest Hobe well.

A. The most northerly well shown on this map, Exhibit 69, is a little over a mile north and about a mile south. Here is another one I notice that is a mile and a half north.

The Court: That is the Roberts?

The Witness: The Roberts well. Then the one on the south is the Sherwood, a little over a mile south.

* * * * *

The Court: Well, what are the documents?

Mr. Rowe: Basic notes.

Mr. McPherson: Let the witness answer.

The Witness: Peerless reports, carbon copies of which come to another party than myself and which I have borrowed during the last hour.

Mr. McPherson: Who is the other party?

The Witness: His name is Carl Hobe.

The Court: Well, I don't see any objection to having them marked. Is there any objection to having them marked for identification?

(Testimony of Charles H. Lee.)

Mr. Rowe: I don't want to lose all our evidence here.

The Court: They are not supposed to be lost. They are in the clerk's file.

Q. (By Mr. Rowe): Will you give a typical one, say January 31st, of the work sheets from which you made the graphs?

The Court: Well, if that was the day of a reading.

(Witness hands a document to counsel.)

The Court: We will mark it for identification No. 72.

(The document referred to was marked Plaintiffs' Exhibit No. 72 for identification.)

Mr. Goldberg: Your Honor, if these are the work sheets from which the graphs are made, may we have them all marked? [1298]

The Court: I don't see any objection.

Does Mr. Hobe object to having them marked here?

Mr. Rowe: We haven't all of the basic sheets. This is just an example of them, showing the method of measuring the wells. We can get them and produce them in the record, if your Honor wants to litter up the record.

Mr. McPherson: You can show that in the record.

Mr. Rowe: I was just going to show the method of keeping the record, is all; but we can have them all in.

The Court: Well, if counsel desire them, they

(Testimony of Charles H. Lee.)

may demand it. I think they are entitled to have them produced, and examine them.

Mr. McPherson: Yes.

Mr. Abercrombie: We do demand them.

Mr. Child: Yes.

Mr. Goldberg: Yes.

The Court: All right; counsel may produce them.

Mr. Goldberg: May we have the remainder? This is only one.

Mr. Abercrombie: The witness said he didn't have the field notes. Are these the field notes, showing the wells that were operated, or other notes?

The Court: Do you have other field notes?

The Witness: Yes, your Honor.

The Court: Well, let's get on. Produce the rest of [1299] those.

That will be marked for identification No. 72.

(The documents referred to were thereupon marked Plaintiffs' Exhibit No. 72 for identification.) [1300]

* * * * *

Q. (By Mr. Rowe): Mr. Lee, how far north and how far south of the San Joaquin River have you noticed a fairly immediate effect of the raising or lowering of the water of the San Joaquin River in the wells?

Mr. McPherson: At what point?

The Court: Any point. There is a limited area here.

(Testimony of Charles H. Lee.)

The Witness: Immediate effects, about two miles to the north and about one mile to the south.

Mr. McPherson: Let me get that down. Immediate effects——

The Court: By "immediate" you mean——

The Witness: Within a few days.

The Court: Within a few days.

The Witness: That is where there was a major change in water level of the river.

The Court: Two miles north and one mile south?

The Witness: That is where the river level changed in a two or three-foot change. [1301]

* * * * *

Q. (By Mr. Rowe): Did you study——

The Court: He has not finished. Also something?

The Witness: Also records kept during the period 1936 to 1938 assembled by the State of California and reproduced in Appendix A of State Report No. 11. There were about 304 wells in that report, of which the detailed record was shown graphically through a period of two or three years. I have examined those carefully.

Q. (By Mr. Rowe): Could you give a summary of your inspection of the 304 fluctuations as shown in State's Report No. 11 that you referred to?

A. Yes. These records were obtained during a period of a great fluctuation of the river and they are particularly valuable for that reason that they show instances of the river where the range of fluctuation was large as compared to the period

(Testimony of Charles H. Lee.)

of record from August 1951 to January 1952 [1304] when the ranges were small, barely 2 feet or a little over.

In this period, 1936, '37 and '38, it amounted to as much as 20 feet in some instances.

* * * * *

The Witness: I classified these wells as far as location is concerned after studying the individual fluctuation records, and there were a large number of them and they were scattered throughout the area under consideration and conditions varied in those different areas so that I grouped the wells.

One group were those lying in the bottom lands between the bluffs of the San Joaquin River. In those wells the [1305] wells, practically all of them, showed a very definite response to changes in the river stage and they indicated a rapid and quick response to the river stage in most cases.

There were some of the wells where there were special local conditions, such as that at the Sims well No. 8, which responded more slowly but in general there was a fairly prompt response to the river levels and with the rise of the river in the spring, with the melting of the snow, and the fall of the river as the water period came out.

That group lay in the bottoms of the River from Friant down pretty well to Gravelly Ford.

Another group were those wells on the bluff on the south side of the river and immediately south of the bluffs, and back under the plains immediately south of the bluffs. In these wells there was quite

(Testimony of Charles H. Lee.)

a definite response to the river fluctuations and river stage changes, but there was a lag amounting to sometimes several weeks in the appearance of a low stage in the river or a high stage in the river, and the wells that were back of the bluffs did not show the detail of fluctuation that did those in the bottoms of the river, the first group.

The third group were those in the plains south of the zone near the bluffs and extending southerly to the limits of the cone or out over the upper plains, and in this group were those wells that were near irrigation ditches they showed the [1306] effect of the seepage from the ditches and return water from irrigation, and the highest levels would occur in such wells in August and September, which are the months when the water finally fails in the river, so that from then on the ditches are either dry or have very small flow in them.

Now the highest level in these wells was in August and September instead of in May and June, as they were in the wells in the river bottom and in the bluffs immediately south of the river bottom, and holding up of the water level in these wells to the later date corresponded with the holding of water in the irrigation districts to into the months of June, July and August, whereas the river would drip during those months.

Then in the plains to the north of the San Joaquin River and east of the Santa Fe Railway, in that area, the fluctuations corresponded with those in the zone of the bluff along the south side

(Testimony of Charles H. Lee.)

of the river, that is, right under in the zone immediately adjacent to the river bottoms, they showed the fluctuations of the river with some delay and without the detail that the wells did in the river bottom.

West of the Santa Fe——

Q. (By Mr. Rowe): May I ask a question there. You referred to the wells south of the river showing a definite response to the rise and lowering of the river. Did the plain north of the [1307] San Joaquin River and east of the Santa Fe Railroad show a definite response to changes in river level?

A. Yes.

The Court: But slower than the south?

The Witness: But with a delay, slower and not with the detail that the wells in the river bottoms showed.

Now in the flange north of the river and west of the Santa Fe and out to the north as far as the ground water trough, which was several miles north of the river, the wells showed fluctuations as they did east of the Santa Fe, they had definite fluctuations which followed those fluctuations in the river with a delay and without the detail of the fluctuations in wells in the river bottoms, but they showed excessive fluctuations resulting from the pumping in wells for irrigation.

That type of fluctuation is one which I have studied in many localities and in this locality, and where the pumping occurs from wells with confined water there is an immediate lowering of water

(Testimony of Charles H. Lee.)

level which extends out to a considerably distance from the well, maybe a quarter or a half mile, as the immediate result of pumping. And when the pumping ceases there is a corresponding sharp rise which takes for its final consummation a considerable period of time but initially there is a sharp rise which may take four or five months finally to recover the original level. And this type of [1308] fluctuation is characteristic of fluctuations in areas where there is pumping for irrigation and it is quite evident in that area west of the Santa Fe and north of the river where they are many irrigation pumps.

The same type of fluctuation was also observed south of the river in the irrigated area where pumping for irrigation was undertaken, although since that date there have been many more irrigation wells installed in the area south of the river than there were at that time.

Q. (By Mr. Rowe): May I ask—not to interrupt—Mr. Lee, when you referred to the plains north of the San Joaquin River and west of the Santa Fe Railway and south of the ground water trough, how far west were you referring?

A. As I recall it, the wells for which records were available lay considerably west of the Madera Irrigation District, that is, the most westerly wells were west of the Madera Irrigation District.

Q. In what vicinity of Skaggs Bridge was the westerly boundary of these wells on the north plains and south of the trough?

(Testimony of Charles H. Lee.)

A. As I recall it, some of them were west of Skaggs Bridge. I would have to examine the list in detail with respect to location to state exactly how far west of Skaggs Bridge. [1309]

Q. And as I understood you, you said those wells showed a relationship in their water level to the rise and fall of the river? A. Yes.

Q. How far north did the water trough extend, say, at Whites Bridge, Highway 99 and along in there, roughly, in this period '36 to '38?

The Court: Presently?

Mr. Rowe: No, the period '36 to '38.

The Court: Very well.

The Witness: It was roughly from two to three and in some places four miles.

Q. (By Mr. Rowe): So that beyond the Madera side this report No. 12, Appendix A, indicates to you a rise and fall of the wells as far as four miles north in the Madera side affected by the rise and fall in the river?

Mr. Abercrombie: I move to strike that question on the gorund it is leading and suggestive.

Mr. McPherson: And argumentative.

Mr. Rowe: I am only summing it up. It is all in there.

The Court: Motion denied.

Mr. McPherson: This is no place for summing up.

The Court: Objection overruled.

The Witness: Yes. [1310]

Mr. Rowe: Would you read the question, please?

(Testimony of Charles H. Lee.)

Mr. McPherson: The witness agreed with you.

Mr. Abercrombie: He answered yes.

The Witness: There were other zones that I haven't yet covered.

Mr. Rowe: Yes.

Q. Will you cover other zones?

A. North of the trough——

Mr. Green: Before he starts covering other zones, may we ask him how he determined where this trough was? He speaks of a trough. Was it the trough that is shown in Report No. 12 on the water contour maps, or Report 11 of the water contour maps?

The Witness: As near as I can remember there was, yes. If it wasn't in that report, it was elsewhere.

Mr. Green: That is, the trough that you are speaking about, when you say north and south of the trough?

The Witness: The trough in the water table as shown by water table contour maps.

Mr. Green: Of the State?

The Witness: Of the State.

Mr. Green: Thank you.

The Witness: Whether or not it was in that particular report, I don't recall, but there are reports made.

The Court: Yes, it is in one of these, either 10, 11 or [1311] 12.

The Witness: But that was the trough.

(Testimony of Charles H. Lee.)

The Court: I think it is in No. 11. There are quite a series of maps.

The Witness: Then those are the ones that I examined when I said trough.

Mr. Green: Thank you.

The Witness: North of the trough the wells showed very little seasonal fluctuation. They in some cases showed response to pumping, irrigation pumping, where there was pumping in the vicinity, but in so far as seasonal fluctuation they showed very little and did not show the effect of the river. Those wells were in the vicinity of the cone boundary between the San Joaquin and the Cottonwood Creek and in such a zone there is a tendency for finer materials to predominate so that the transmission of effect through such material is slower or dampens out entirely and it is not to be expected that in such a zone there would be the effect of the river change shown. [1312]

Now, immediately north of the boundary of the cone of the San Joaquin is the alluvial cone of Cottonwood Creek, and the wells in the alluvial cone of Cotton wood Creek showed very distinctly and immediately the response to any flow in Cottonwood Creek.

The Court: But not to the flow in the San Joaquin River?

The Witness: No. They showed response to the flow in Cottonwood Creek, but not the San Joaquin River.

Q. (By Mr. Rowe): Then with reference to

(Testimony of Charles H. Lee.)

the northern exterior boundary of the alluvial cone of the San Joaquin River, where did the influence of the San Joaquin River rise and fall stop?

A. The influence on the north side extended out as far as the ground water trough, which was from two to four miles south of the river. On the south side——

Q. No; but how did the ground water influence its location during those years, to conform with the alluvial cone on the north side of the river?

A. It was very close to the boundary of the alluvial cone, but a little south thereof.

Q. So you would say, wouldn't you,——

Mr. Green: In these years '36 and '37? Is that the years you are talking about the boundary of the alluvial cone and the trough being approximately the same? [1313]

The Witness: Yes; I would be able——

Mr. Rowe: He said '37 and '38.

The Witness: ——to answer that a little more accurately if I had the maps in front of me.

The Court: Here they are. There is a series of them. I think they begin in—I have forgotten the year.

The Witness: I have one here now, October, 1938, but I think there were others.

The Court: Here, "Lines of Equal Elevation and Ground Water Table." Here is report No. 11 and here is report No. 12 (handing to the witness).

Q. (By Mr. Rowe): Mr. Lee, here are the 800

(Testimony of Charles H. Lee.)

square feet of water contours, too, if you want to use them.

The Court: What is that?

Mr. Rowe: I told him we had 800 feet of water contours, over the years, that he could have.

The Court: The question is whether or not in his opinion the northerly boundary of the alluvial cone corresponds to the water trough, as shown by State's Report No. 11, and his ground water maps for the years, I believe, 1936 to 1938, is it?

The Witness: '36 to '38, yes.

The Court: Inclusive.

Mr. McPherson: For the purpose of clarity, and so the [1314] witness will not confuse himself, I understood the witness to say the influence of the San Joaquin stopped at the ground water trough as reflected by contours, without reference to years. Isn't that right?

The Court: That is the question that is now pending. His reference to the ground water trough heretofore was to these maps made by the State for these years.

The Witness: During these years, 1936, '37 and '38, the ground water trough was very close to the boundary of the San Joaquin alluvial cone.

The Court: Northerly?

The Witness: Northerly; and it laid from two to four miles north of the river. [1315]

* * * * *

A. SEGEL

recalled as a witness by and on behalf of the plaintiffs, having been previously duly sworn, was examined and testified as follows: [1375]

* * * * *

Cross Examination * * * * *

Q. (By Mr. Abercrombie): Do you know whether any of these wells are affected by any other wells in the City that might then be operating?

A. Theoretically, perhaps; but these wells are, on an average, 2000 feet apart, so there isn't much chance of that.

Q. In other words, you feel that there is no chance of an effect from other wells, because the other wells are spaced at 2000-foot intervals?

A. Yes, that is right. [1389]

* * * * *

CHARLES H. LEE

resumed the stand and testified further as follows:

Mr. Rowe: The fact that we haven't any data from Mr. Ingerson will make us change our plan of presentation of testimony. We hoped to have analyzed these wells by now but I think we can proceed.

Direct Examination—(Continued)

* * * * * [1398]

Q. (By Mr. Rowe): Mr. Lee, referring to your testimony of yesterday, have you any further comment to add to your findings with respect to your

(Testimony of Charles H. Lee.)

study of the water level fluctuations in the 304 wells shown in State Report No. 11?

A. Yes. With respect to the group of wells——

Mr. McPherson: This would be another group than those you gave?

The Witness: No, the group of wells which I described yesterday as being south of the bluffs of the San Joaquin River and within——

The Court: South of the south bluff?

The Witness: South of the south bluff of the [1399] San Joaquin River and within the Fresno Irrigation District.

Those wells, in addition to showing the effect of running water in the ditches during the summer months also showed a very marked rise in the low and high stages from the period '36 to '38, that is, each winter's low would be considerably higher than the preceding winter's low, and each summer's high would be higher than the preceding.

There was no corresponding increase in the amount of diversion by the districts and the source of the water then, that is, that portion of the water derived from the ditches, did not increase from year to year during those years.

The fact that the water levels did increase and that there was a very marked tendency for the general level of the water to rise is, in my opinion, indicative of the increased flow that occurred in the San Joaquin River during those years.

The San Joaquin had a very marked increase in its flow in '38 over '37 and '37 over '36, with much

(Testimony of Charles H. Lee.)

higher stages in the river each of those years than in the succeeding years, so that it is my conclusion from the study of those well records within the irrigation district that they were affected not alone by irrigation but by the flow of the San Joaquin River.

Q. (By Mr. Rowe): Mr. Lee, in other words, even in the years when [1400] the Fresno Irrigation District dropped the amount of water they put in the irrigation ditches, when the San Joaquin River rose and flowed more the wells in the Fresno Irrigation District went up?

Mr. Abercrombie: Move to strike that question as highly leading and suggestive.

Mr. Green: It also assumes a fact not in evidence.

The Court: Overruled.

The Witness: Yes. I might state that the Fresno Irrigation District net diversion in 1936 was 28 per cent above a 30-year average, in 1937 it was 22 per cent above, and in 1938 it was 19 per cent above.

In other words, it was decreasing each of those years, whereas in the San Joaquin the flow of the river in 1936 as compared to a 30-year average was 2 per cent below average, in 1937 it was 15 per cent above, and in 1938 it was 93 per cent above.

In other words, in 1938 it was almost double the average in the San Joaquin, whereas in the diversion of the Fresno Irrigation District there was a tendency to decrease from year to year.

Mr. McPherson: What 30-year base did you use, Mr. Lee?

(Testimony of Charles H. Lee.)

The Witness: About 1920 to 1950. [1401]

* * * * *

The Witness: In 1950, the elevation of the divide at that point was 269 feet above sea level. The elevation of the water level in the San Joaquin River at the nearest point, about a mile northwest of Pinedale, the lowest level in that year was 250 feet above sea level. The difference in elevation of the top of the divide and the lowest level in the river in that year was 19 feet. A higher level occurred at various times during the year and at such times the difference in elevation of the top of the divide and the river surface was less than 19 feet.

But considering the minimum level of the year, where the difference of elevation was 19 feet, if the rate of drop of the wells within the cone of the depression of the San Joaquin River in the city of Fresno and of the water divide continue their drop at the rate of 4 to 4.3 feet, it will require the elapse of from 4 to 5 years only before the cone of depression centering in the city of Fresno will have broken through the ridge and the level of the top of the [1429] divide would be the same as in the river at its lowest level at this point just northwest of Pinedale. [1430]

* * * * *

Mr. Green: For the record, Mr. Lee, what do you call a relatively small drop? How many feet does the graph show between 1947 and 1948?

(Testimony of Charles H. Lee.)

The Witness: In the average it shows a drop of 3.5 feet from '47 to '48.

The Court: In water surface and wells?

The Witness: In the average water surface and wells throughout the district.

Now, then, in '49 there was a further decrease in the diversion and further drop in the wells which, on the average, was 4.5 feet.

Then the next year, in '50, there was an increase in the diversion of about a hundred thousand acre-feet and a rise in the water level average of about 1.5 feet.

Now during this same period the water level in the northwest [1452] district in the year '49 and '50 instead of dropping 10 feet as did the average, or 8 feet as did the southwest district, or 5.5 feet as did the east district, it dropped 14.5 feet, a very much greater quantity.

The Court: To what period, to the end of the year '49?

The Witness: That was from the summer of '49 to the summer of '50.

The Court: To the summer of '50?

The Witness: Yes. That is, from the summer of '49 to the summer of '50 there was a very much greater drop in the northwest district wells than in the average for the district or from the other two districts.

Q. (By Mr. Rowe): Mr. Lee, comparing the last three years on the total diversion of the Fresno Irrigation District to the line of the northwest dis-

(Testimony of Charles H. Lee.)

trict, does the drop correspond with the amount of water put on the land by the irrigation district?

A. No, it is of a much greater magnitude.

Q. Now in 1950 was the diversion by the Fresno Irrigation District above or average or below average?

The Court: What was that?

(The question referred to was read by the reporter as follows:)

("Q. Now in 1950 was the diversion by the Fresno Irrigation District above or average or below average?") [1453]

The Court: From the Kings River?

Mr. Rowe: Yes.

Mr. Goldberg: Average for what years?

The Court: The 30-year average, or what? For what year?

Q. (By Mr. Rowe): Have you an average that you can use, Mr. Lee?

A. I haven't the exact figure with me as to the variation from the average in that year.

Q. Would you get that during the noon recess?

A. Yes.

Q. Now have you prepared another chart showing the flow of the San Joaquin River?

A. Yes.

Q. And is that called a monthly hydrograph of San Joaquin River, or what do you term that?

A. That is called "Monthly Hydrograph San Joaquin River Near Friant from 1907 to 1951."

Q. Have you that chart? A. Yes.

(Testimony of Charles H. Lee.)

Mr. Rowe: This will be No. 19.

The Court: Yes.

(The document referred to was marked Plaintiffs' Exhibit No. 79 for identification.)

Mr. Rowe: I ask that the last chart be introduced as Exhibit 78. [1454]

The Court: No. 78 is admitted in evidence.

(The document referred to was received in evidence and marked Plaintiffs' Exhibit No. 78.) [1455]

* * * * *

The Court: What deduction, in your opinion, is to be made from that: that the flood flow of the river replenished the water levels in the wells?

The Witness: Yes. [1468]

Mr. Goldberg: I will object to that question, your Honor, as lacking in foundation.

The Court: Overruled. He is qualified as an expert and he can give his opinion.

Mr. Goldberg: But there were other facts which have not yet been testified to.

The Court: You can bring those out on cross examination. He has enough to give his opinion on, if he has. I do not know. Maybe he does not have.

The Witness: Yes, I have.

The Court: Very well.

Mr. McPherson: In other words, you agree with the court that the reduced flow of the San Joaquin produced this drop shown on your Exhibit 78?

The Court: I did not ask if he agreed with the court. That is not my question at all.

(Testimony of Charles H. Lee.)

Mr. Reavis: I wonder if the reporter would read the court's question?

Mr. Rowe: I might say when the shoe begins to fit it starts to pinch with Mr. McPherson. You can always tell that.

Mr. McPherson: There wasn't any innuendo in my question.

Read the question, Mr. Reporter.

(The question referred to was read by the reporter as follows:) [1469]

("The Court: What deduction in your opinion is to be made from that, that the flood flow of the river replenished the water levels in the wells?")

Mr. McPherson: And the answer?

(The answer referred to was read by the reporter as follows:)

("The Witness: Yes.")

Q. (By Mr. Rowe): What other deduction did you make comparing Exhibit 78 and 79, Mr. Lee?

A. The deduction which I made and the answer which I gave to the court's question, I considered that there were various sources of supply available for the replenishment of the water table in the Fresno Irrigation District in the northwest district.

There was the water brought in from Kings River in the system of the Fresno Irrigation District carried in ditches and spread out on the lands for irrigation. Such water would contribute to the water table through seepage from the ditches and from return water from irrigation.

(Testimony of Charles H. Lee.)

There was also direct rainfall upon the surface of the ground which would contribute in some years to the water table. Usually the rainfall in an area such as Fresno, with a relatively small rainfall, becomes an addition to the moisture [1470] in the soil above the water table and is available to plants but very little of it goes to the water table itself except in exceedingly wet years, so that the rainfall in so far as the water table is concerned is minor or negligible.

The Court: That is the rain falling upon the ground which is within the area of the Fresno Irrigation District?

The Witness: Yes, that is the rainfall I am referring to.

The Court: You do not mean rainfall in the watershed or the tributaries of the rivers, and so forth?

The Witness: No, I mean the rainfall upon the farms that are irrigated. There the rainfall does enter the soil and becomes part of the soil moisture, the capillary films, and is available to plant roots, but there is very little of that rainfall that gets to the water table.

Then south of the San Joaquin cone there are the streams Dry Creek and Red Dog Creek, and other streams which, in wet years of flood flow, which for a short period of time spreads out over the surface and provides water which gets down to the water table, but the period of those flows is very short so that the quantity of water reaching the

(Testimony of Charles H. Lee.)

water table by replenishment from those streams is relatively small.

Then there is the other possibility of supply within the cone of the San Joaquin River, namely, the seepage of water from the river, the San Joaquin River, its percolation [1471] through the gravels of the river bottom and thence into the aquifers underlying the higher ground beyond the bluffs to the south, the upper end of which aquifers are open along the side of the river valley below the bluffs, the existence of which is indicated by the well logs and other studies already presented.

With higher levels in the river the pressure upon the water within the gravels under the river and under the river bottom lands is greater and the pressure against the opening of these aquifers is greater and also any percolation there is through the material between aquifers is greater. This pressure acts as a——

The Court: What do you mean by pressure? That is the pressure of a flood flow?

The Witness: Yes, your Honor, the pressure of higher level.

The Court: Higher level?

The Witness: The water is higher during the flood flow periods and during these periods there is an additional head of water in the river and it is indicated by the well fluctuation records that that is carried out into the river bottom lands. The water levels in the wells in the river bottoms indicates that they follow the river up and down, so

(Testimony of Charles H. Lee.)

that there is a higher level of water out to the edge of the river bottom lands following the level rise of the water in the [1472] river itself, and this puts greater pressure upon the walls of the old canyon which is now partially filled with gravel and so puts greater pressure at the entrance to any aquifers that there are in that wall.

The Court: Does it increase the flow in the aquifers beyond the river bottoms, that is, does it increase the amount of water?

The Witness: Yes. As this pressure continues there is an upward percolation. The aquifers are confined in material which is more impermeable than the aquifers themselves but which does permit of percolation from the aquifers so that where a greater pressure exists within the aquifers there is an upward pressure against the formations which cover the aquifers forcing water upward and ultimately raising the water table.

The Court: In wells beyond the river bottom?

The Witness: In wells beyond the river bottom and out into the cone clear across the cone to the extent of the aquifers which will be found on the surface, that is, the old channels extend many miles and establish the cone and the underground aquifers similarly which have been buried extend throughout the cone and with their interconnections have opportunity of feeding throughout the cone.

Now with this upward pressure there is an upfeeding to the water table from below and the water table rises as a result of this pressure.

(Testimony of Charles H. Lee.)

With the absence of the pressure on the other hand, a lowered pressure within the aquifers, then there is a draining of the materials above and a final effect of lowering the water table which is the level of the top water.

The effect of these variations then in the level of the river is either to feed water throughout the cone and to raise the water level in the top water from below or to drain throughout the cone and to pull down the level of the top water.

Mr. Abercrombie: Do I understand you, Mr. Lee, that you now say this water is flowing from the San Joaquin River throughout the cone or is this just theoretical?

The Court: That is cross examination.

Mr. Abercrombie: I can't understand it unless he explains it.

The Court: That is the purpose of cross examination.

The Witness: I have now described the various sources of supply available.

Q. (By Mr. Rowe): Answering Mr. Abercrombie, Mr. Lee, is the San Joaquin River a source of supply in the alluvial cone of the San Joaquin River in that part known as the northwest area of the Fresno Irrigation District?

A. Yes. As I have explained it, it is one of the sources of supply.

Mr. Abercrombie: Then it is not theoretical, it is the present condition?

(Testimony of Charles H. Lee.)

The Witness: It is present conditions and has been in past years for many years.

The Court: Would you say, as far as many years back as far as these records go, to 1921?

The Witness: Yes, and of course a natural condition which has existed from time immemorial. Before irrigation it was the sole source of supply.

Q. (By Mr. Rowe): And carrying that particularly to the alluvial cone in the northern part of the city of Fresno, would you say the San Joaquin River is presently one of the sources of supply of the alluvial cone in the northern limits of the city of Fresno? A. Yes.

The Court: And for how long has it been?

The Witness: From time immemorial.

Q. (By Mr. Rowe): Now, Mr. Lee——

Mr. Abercrombie: Just one thing before you leave that, Mr. Rowe.

Have you described all the sources of ground water replenishment in this area that you have been speaking of north [1475] of the river or south of the river?

The Witness: North of the cone?

Mr. Abercrombie: Yes.

The Court: That is what you mean?

Mr. Rowe: North of the southern boundary.

The Court: North of the southern boundary of the cone?

Mr. Abercrombie: Yes. He has listed water from Kings River, direct rainfalls and flood flow of Dry

(Testimony of Charles H. Lee.)

Creek and seepage from the San Joaquin River. Are those all the sources?

The Court: Dry Creek and he said Red Dog Creek too.

Mr. Rowe: Red Dog and these others.

The Witness: I spoke of those creeks as sources of supply south of the San Joaquin cone, not on the San Joaquin cone.

Mr. Abercrombie: That is right. The flood flows of those streams are the ones you are talking about?

The Witness: As a source of underground water south of the San Joaquin cone but not north of the boundary.

Mr. Abercrombie: Those are all the sources?

The Witness: Well, as indicated. I just indicated that they are sources; yes.

Mr. Abercrombie: Are they all the sources? That is what I am asking, Mr. Lee.

The Witness: Well, further down the cone one goes the greater is the proportion of water from the San Joaquin seepage [1476] outward under the bluffs by reason of the fact that the general run of material becomes more permeable and finally below Herndon the aquifers and the material surrounding the aquifers becomes more and more homogenous until the percolation is general throughout the walls of the valley and that water comes from the San Joaquin but it permits a much greater loss of water from the river than further upstream where the aquifers are more limited in their area as exposed.

Mr. Abercrombie: That wasn't the question, Mr.

(Testimony of Charles H. Lee.)

Lee. In the area covered by the Fresno Irrigation District, which is the area you are describing, you delineated water from Kings River, direct rainfall and the flood flows of Dry Creek, Fancher Creek and similar creeks coming out of the mountains, and seepage from the San Joaquin River as being all the sources of underground water supply replenishment for that area. Now are those all the sources? That was my question.

The Witness: Well, there are others——

The Court: He did not say north of the cone.

Mr. Abercrombie: Not north of the cone. If I said that I misspoke myself. I meant the area covered by the Fresno Irrigation District.

The Court: The whole area?

Mr. Rowe: I object to that. The direct examination is limited primarily to the cone. [1477]

Mr. Abercrombie: That is all right. Limit it to the area in the cone. I just want to know if he has stated all the sources.

Mr. Rowe: In the entire Fresno Irrigation District?

The Court: No, he changed his question now to within the cone of the San Joaquin River. He did not say that the Red Dog Creek or Dry Creek contributed to the aquifers within the cone of the San Joaquin River; he said they contributed to the aquifers of the water level in wells south of the cone.

Is that not your testimony?

The Witness: That is my testimony. [1478]

(Testimony of Charles H. Lee.)

Mr. Abercrombie: They don't contribute at all, then; is that your testimony?

The Court: You can get around to that on cross-examination.

Q. (By Mr. Rowe): In other words, Mr. Abercrombie asked you if Dry Creek——

The Court: Are you going to cross-examine for Mr. Abercrombie or is it part of your direct?

Mr. Rowe: I will reframe it.

Q. Mr. Lee, applying that to the City of Fresno, what are the major sources of supply to the wells within the alluvial cone of the San Joaquin River and lying within the boundaries of the City of Fresno?

A. The major sources of supply are the seepage from Fresno Irrigation District canals and return water from field irrigation under that canal system, the seepage on percolation from the San Joaquin River and the percolation from waters of small ravines along the hills between Fresno and San Joaquin River, which in very occasional years of flood water, in some years the amount is practically negligible, other years it is larger, but it is very effervescent and of short duration and is not comparable at all to the continuous supply of water from a large stream like the San Joaquin.

There is also some percolation into the cone area from [1479] absorption from rainfall on the hill slopes of the foothills bordering the cone to the east between Fresno and the San Joaquin River.

(Testimony of Charles H. Lee.)

Then there is the other major source of the percolation from the San Joaquin River itself.

Q. And you consider the percolation, the present percolation from the San Joaquin River and from time immemorial, a major source of supply to the wells within the boundaries of the City of Fresno and lying within the alluvial cone of the San Joaquin River?

Mr. McPherson: We object, argumentative.

Mr. Rowe: No, I am just summing up.

The Court: Overruled.

Mr. McPherson: It is leading.

The Court: Yes, it is leading, but I will overrule the objection.

Mr. McPherson: We renew our objection.

The Court: Overruled.

The Witness: Yes, it is one of the sources of supply of that area, and one of the major sources.

Q. (By Mr. Rowe): You are familiar with the Bureau's plan as submitted under the title, "Plan for Physical Solution," are you not?

A. Yes. [1480]

The Court: Before you get on to that, I wonder if I could ask the witness a question about the aquifers.

I understood you to say in response to a question by the court last week that the effluvia from the rivers, all of them, in the creeks, was the same kind of material generally and followed the same pattern, that is, out of the mountains onto the valley.

(Testimony of Charles H. Lee.)

The Witness: Yes, your Honor, to the extent that the larger streams carry——

The Court: I know; bigger boulders and more dirt.

The Witness: ——effluvia.

The Court: Effluvia of bigger size, larger size.

The Witness: Yes.

The Court: And also as geologic formation would change from stream to stream, the geological character of the material might differ.

In your study of this problem you have, or have you, made any studies or come to any conclusion as to the northerly boundary of the alluvial cone of the Kings River?

The Witness: Yes.

The Court: Does it join the San Joaquin River?

The Witness: No. But Dry Creek cone continues right straight through to the trough of the valley.

The Court: Now, the effluvia or alluvia laid down by the Dry Creek, was that of the same character and kind as [1481] that brought out of the mountains and laid down by the San Joaquin River, except smaller?

The Witness: Smaller, and also it would differ by the differing geologic formations which were furnished or which furnished that material.

The Court: The Dry Creek does not have its watershed in the mountains in as large a basin, then, I take it, as the San Joaquin?

The Witness: No; Dry Creek is more in the

(Testimony of Charles H. Lee.)

foothills. It does not extend back into the mountains.

The Court: So it would lay down the alluvia from the foothills?

The Witness: Yes, sir.

The Court: What I am getting at is this: In other words, if you have aquifers that are laid down by the San Joaquin River and say they are six foot six, or gravel and boulders, and against that are the same kind of aquifers or aquifers which will permit the penetration of water—they do not lie up in walls, I suppose they line in lenses—if the water is withdrawn from the San Joaquin aquifers and there is a supply of water introduced into those same aquifers in the adjacent area, does not that water introduced in the adjacent aquifers flow into the San Joaquin aquifers?

The Witness: Well, there are two aspects of that.

The Court: Or vice versa? [1482]

The Witness: There are two aspects of that. In the first place, the tendency is for adjacent cones or deposits from adjacent streams to interbed, that is, at one time——

The Court: Overlap and lie in lenses?

The Witness: ——overlie in lenses, and sort of interbedding. One stream will flow over the cone or boundary at one time with one flood, and the other stream may subsequently flow back over that, so that there is a certain interbedding and a certain interlacing at the margin along the boundary.

(Testimony of Charles H. Lee.)

That is one aspect of the point which you have asked. [1483]

The other is the degree of deposition of finer materials at the margin. There is a tendency for the finer materials to flow out to the edges of a river's deposit, that is, the water deposits the coarser material near the mouth of the canyon or on the upper slopes and carries out the finer material in suspension to the margins.

The Court: And they are not as permeable as the coarser material?

The Witness: They are not as permeable as the coarser material. So there is a barrier between adjacent cones which may be greater and more effective on the lower slopes than on the upper slopes because of the fact that the coarser material is deposited on the upper and the finer material is carried still further down.

The Court: We will assume that the water level in the wells lying southerly of the south boundary of the San Joaquin River was reduced precipitously and rapidly, as much as 10 or 20 feet; would the water in the San Joaquin River aquifers then flow into those aquifers beyond the alluvial cone?

The Witness: Where the interbedding occurs so that there is a continued extension of San Joaquin aquifers into an area of a cone south, should such a flow occur, there may also at times have been a rehandling of material or due to ponding and subsequent flow by which at some levels there may be more of a sheet deposit—— [1484]

(Testimony of Charles H. Lee.)

The Court: Would water flow in there or vice versa? If the levels in the San Joaquin cone were precipitously reduced, and by that I mean rapidly pumped out so that the level in those wells were reduced as much as 10 or 20 feet, would the water then come through the other boundaries of that cone and seek its level there?

The Witness: It is possible.

The Court: One other point. There are a number of very deep wells drilled in the San Joaquin valley, are there not, on the west side of the valley?

The Witness: Yes.

The Court: Some as deep as 2000 feet?

The Witness: I don't recall if there are any water wells that deep, but there are some 1800 or 1600.

The Court: Producing fresh water?

The Witness: Yes.

The Court: Where does that water come from? How did it get there, by seepage from the flow of the rivers that have come from the mountains?

The Witness: The source of that water is probably threefold: Some of it was incorporated in the alluvial debris when it was deposited at those lower levels. In other words, the material has a void, 30 or 40 per cent, which is filled with water.

The Court: Then the water came down in the river? [1485]

The Witness: And the water has always been there from the time of the material being deposited

(Testimony of Charles H. Lee.)

as it was brought down by the river or a lateral stream.

Then there is also another source, which would be the lateral percolation from the lateral streams such as the Kings and San Joaquin as the cones of those streams merge into the trough at the lower levels of these cones so that the percolation is at a lower depth. [1486]

* * * * *

The Witness: Not the cone itself, but the margins of the cone tend to have finer material deposited, so the margins of the cones act somewhat as barriers.

The cone itself would be permeable, but on its margin with the Kings River, or, rather, on Dog Creek, Dog Creek with Red Bank and Red Bank with Fancher Creek, there would be a tendency for less permeable material along the borders of each of those cones, where they meet, and finally [1491] Fancher Creek and Kings River; so the four small stream cones, each with a finer and less permeable material on its margin, would intervene between Kings River and San Joaquin, and each would tend to be a barrier.

* * * * *

The Court: And Exhibit 1, you have indicated here, the modern alluvial cone and the ancient alluvial cone.

Now, do I understand your testimony to be that generally the coarser gravels lie, and boulders lie, closer to the mountains and more within the bound-

(Testimony of Charles H. Lee.)

aries of the ancient alluvial cone than within the boundaries of the modern alluvial cone?

The Witness: Yes. [1492]

* * * * *

Q. (By Mr. Rowe): Now, Mr. Lee, what would the effect be if the Enterprise, Dry Creek and Herndon canals were cemented——

Mr. McPherson: Objected to, incompetent, irrelevant, and immaterial.

Q. (By Mr. Rowe): ——on the water in the wells within the boundaries of the City of Fresno, and within the boundaries of the alluvial cone of the San Joaquin River?

Mr. McPherson: I object, incompetent, irrelevant, and immaterial; not probative of any issue in this case.

Mr. Goldberg: Asked and answered last week.

The Court: Overruled.

The Witness: It would remove one of the [1499] important sources of water supply, ground water in the cone of the San Joaquin River, and would deprive the cone of that source of supply from the canal. [1500]

* * * * *

Q. (By Mr. Rowe): Mr. Lee, what would happen to the wells within the boundaries of the City of Fresno and the alluvial cone of the San Joaquin River, if the Bureau's plan of so-called physical solution were put into operation?

A. It would tend to decrease the supply of water available to those wells.

(Testimony of Charles H. Lee.)

Q. And if the State's——

The Court: Well, to what extent? "Tend to decrease," I mean that——

The Witness: It would tend to decrease it to the extent that the seepage from the San Joaquin River was decreased and percolation therefrom, and the level of the river was lowered so as to reduce the pressure causing that [1502]seepage and percolation.

The Court: The long and short of that answer is that they would lose some water, but how much? I mean, do you have any—is there any comparable statistic here where the river was lower or there was not seepage, which would be comparable with the water flowing down the river under the Bureau's plan?

The Witness: I have made studies, yes, your Honor.

The Court: Well, how much? If the influence on the wells would be negligible, that is to say, they would lose a foot a year and come back up, what difference does it make?

Q. (By Mr. Rowe): Would it be negligible or material?

A. It would be material.

Mr. McPherson: What do you mean by "material"?

The Witness: 90 per cent. [1503]

* * * * *

The Witness: Pumping, with a 90 per cent reduction in the supply of an important contrib-

(Testimony of Charles H. Lee.)

utor to the supply of the cone, would cause a continued lowering in excess of that which has been taking place during the last three or four years, which has amounted to 8 feet per year in the wells in the southwest district. [1504] * * * * *

Q. (By Mr. Rowe): Before going on to this, have you any further remarks and explanation of your statement on the effect of wells within the city of Fresno, Mr. Lee?

A. Yes. Any reduction in the supply of the underground water in the cone of the San Joaquin River in Fresno or vicinity, either by the installation of a plan such as proposed by the State or the Bureau, or the lining of irrigation canals in that vicinity, would bring about a serious situation in the provision of water supply for the city of Fresno and its inhabitants. In view of its present demand and rapid growth, immediate steps would have to be taken to secure a supply from surface sources. [1514] * * * * *

The Witness: The measuring station was unavailable for use after the 16th of September, 1951, so there are no daily measurements available after that time at Whitehouse. [1544] * * * * *

The Witness: Now, when an increase of flow takes place in the river, it would raise the level of the river, and the river level would then be higher than the water level in the soil adjacent to the river, in its banks, and water would then flow, by seepage from the river, into the bank.

* * * * *

GEORGE E. P. SMITH

called as a witness on behalf of plaintiffs, having been first duly sworn, was examined and testified as follows:

The Clerk: Will you state your name, please?

The Witness: Smith; George E. P. Smith. [1560]

* * * * *

Mr. Rowe: No; in the pretrial conference, we had a stipulation that testimony introduced at the temporary injunction and restraining order hearing, in 1951, may be considered as introduced in this hearing, subject to the right of cross examination.

The Court: That stipulation was if you offered the testimony. You have not offered it.

Mr. Rowe: I am offering it.

The Court: Then you offer all of Prof. Smith's testimony taken in the 1951 hearing on the temporary or preliminary injunction matter, at this time?

Mr. Rowe: Yes.

Mr. Abercrombie: That if you called the witness now and asked the same questions, he would give the same answers; I think that was the stipulation. [1561]

* * * * *

Q. (By Mr. Rowe): What is the capacity of storage, total capacity, of the present dam, Professor?

A. I did state that as 320,000 acre-feet for irrigation.

(Testimony of George E. P. Smith.)

The Court: My question is the total storage.

The Witness: Plus 70,000 for flood control, plus 130,000 dead storage, equals a total of 520,000 acre-feet. [1576]

* * * * *

Q. (By Mr. Rowe): According to the State's report, what is the capacity of the Friant reservoir site?

Mr. Goldberg: I object to that, The report speaks for itself.

The Court: Overruled.

The Witness: The capacity is shown by the report to be feasible up to 853,000 acre-feet, but how much further I do not know. [1578]

* * * * *

Q. (By Mr. Rowe): Professor Smith, for the purpose of the record, what is the highest storage capacity shown by the Report 29 for Temperance Flat reservoir site?

A. 1,200,000 acre-feet.

The Court: 1,180,000, is it not?

The Witness: The measurements, the surveys and measurements are so approximate that I like to round out the figure. [1584]

* * * * *

The Witness: In the selection of Friant as opposed to Temperance Flat, a very serious mistake was made. It was an honest mistake, and it is regrettable, but it was a terrible mistake and it cost the State of California untold millions of dollars.

* * * * *

(Testimony of George E. P. Smith.)

For comparison, at Roosevelt Dam the storage capacity is twice the average annual runoff, and at the Coolidge Dam it is four times as great as the average annual runoff, and we wouldn't detract one acre-foot from that storage capacity.

In the Elephant Buttes the storage capacity is 2,600,000 for a stream with an average annual runoff of 1,100,000. [1588]

* * * * *

Q. (By Mr. Rowe): Professor, regarding the storage underground in the southern end of the San Joaquin Valley, are you familiar with the attempts to store it underground since Friant Dam was started to be constructed, and if so will you state?

A. I think the opportunities for storage underground are very limited. In districts like Delano and the South San Joaquin District, I don't see how they are going to get very much underground, but one way that is—— [1590]

* * * * *

Q. (By Mr. Rowe): Professor, going back to studies made of storage water underground, you have been down to Bakersfield and visited with the United States Government Experimental Station there to see whether they could store water underground in Kern County from the Friant-Kern Canal?

A. Yes, sir. The authors of the plan show in their Bulletin 29 and other bulletins that they assume that all that is necessary is to snap their

(Testimony of George E. P. Smith.)

fingers and the water would go underground, but when they tried it it just wouldn't.

Beginning in 1935 a great deal of land has been laid out for basins or ponds or lakes in which the water is to be constantly run and constantly seep to the underground.

Q. What county is that in, Professor?

A. There have been parts along the Friant-Kern Canal, but the largest areas were in Kern County. There is quite a large area in Madera County too.

Mr. Abercrombie: We can't tell, your Honor, what the witness is talking about. There are as many kinds of soil as there are kinds of people in Kern County. We would like to know where. [1592]

The Court: Maybe if counsel would not interrupt so often we would find out sooner or later what the witness has to say.

Q. (By Mr. Rowe): Professor, directing your attention to the efforts of the United States Government in Kern County, what has been done down there?

Mr. Abercrombie: My whom, Mr. Rowe?

Mr. Rowe: The United States Government.

Mr. Abercrombie: What branch of the Government?

Q. (By Mr. Rowe): What branch, Professor?

A. In the beginning of 1935 a very competent engineer of San Francisco, whose name is Mr. Hale, has worked—he worked until his death a few years ago—in an effort to find some way to overcome

(Testimony of George E. P. Smith.)

nature and make that water go underground, and he was not able to. Then after his death the Soil Conservation Service, Research Division, took the project over.

Q. Was that the United States Soil Conservation Service?

A. And they have had three men working there for a long time, a microbiologist, a soil scientist and an engineer, and the work has been in charge of a Mr. Muckel, who is quite [1593] an authority on water spreading for recharging ground water as there is anywhere, and Mr. Muckel, I heard him give us a lecture a few months ago, in November, and the only hopeful thing he had to say was that where they have spread six inches of gin trash over the land—it cost about $500 an acre—the water will seep in continuously and it is believed that the value of the gin trash will continue for about five years. At least that is his assumption.

Q. Professor, where are these tests of Mr. Muckel and the Soil Conservation Service in getting water underground, what county have they been made in? A. In Kern County.

The Court: Whereabouts in Kern County? Various places?

The Witness: There were 15 or 20 places laid out and tried for a while beginning in 1935, but for many years the tests have been made at two points, one is Wasco, and I don't recall the name of that other spot.

The Court: Is it east or west of Bakersfield?

(Testimony of George E. P. Smith.)

The Witness: Northeast, I think.

The Court: Northeast?

The Witness: Perhaps approximately north, just a few miles. The people who are carrying on these experiments, and they have a tremendous lot of equipment, they have an office in Bakersfield.

Q. (By Mr. Rowe): That is the Soil Conservation people of the United States? A. Yes.

Q. You visited there?

Mr. Abercrombie: This is alkali soil that he is talking about?

The Court: What was the nature of the soil?

The Witness: No, they wouldn't try to put it in alkali soil. The North Kern Water Association——

Mr. Abercrombie: North Kern Water Storage District.

The Witness: I think that is the name of the organization which is sponsoring this work, and they are continuing it and actually the Kern Land & Cattle Company is planning to lay out 400 acres —I think it is 400 acres—and cover that all over with six inches of gin trash, if they get that much.

Q. (By Mr. Rowe): Professor, outside of this method with the gin trash in Kern County, have they been able to successfully store water after this eight years of research?

A. No, sir. Eight years have gone by since the San Joaquin River flow was controlled at Friant [1595] Dam and practically no progress has been made.

* * * * *

(Testimony of George E. P. Smith.)

The Witness: The power companies should be allowed to store water ad libitum to permit them to make maximum power at all times except in July and August, when they should be required to release water for the late summer irrigation outside, inasmuch as Millerton Lake usually gets low or is nearly empty by that time.

The Court: All right. [1618]

The Witness: In other words, that would reenforce the water supply in Millerton Lake.

The Court: Your opinion is that they should be required to be kept at 100 per cent storage capacity until July?

The Witness: Yes.

The Court: All right. Now, if they were kept at 100 per cent storage capacity until July, how much additional water would that make available?

The Witness: Assuming that they are full on July 1st, there would be 288,000 acre-feet of water which would be released, and should be if it is necessary, on any particular year like 1924 or 1931, or other years of very low runoff.

The Court: That is 288,000 additional acre-feet?

The Witness: 288,000 acre-feet in storage capacity of those three reservoirs.

The Court: Well, would that mean 288,000 acre-feet additional to what is now available by the maintenance of these contracts at Millerton Lake?

The Witness: Yes.

The Court: That would be additional acre-feet?

The Witness: Yes.

(Testimony of George E. P. Smith.)

The Court: All right. [1619]

* * * * *

Q. (By Mr. Rowe): All right, what next, Professor?

A. My objective is that if the waters of the San Joaquin River were properly conserved there would not be such penny-pinching; there would be —I won't say water for everybody, all they want, but there would be so much water that the controversies would be minimized.

The second point is additional dams farther up in the mountains. The Southern——

Q. Southern California?

A. Southern California Edison Company has a permit for two reservoirs in the mountains, with combined storage capacity of 250,000 acre-feet, and I am sure that, with proper negotiations which would not penalize the power company in any way, shape or form, but would probably leave them with as much power in the end, that the upper two-thirds of that storage could be made available for irrigation purposes.

The Court: Annually?

The Witness: Yes. [1621]

* * * * *

The Witness: My third comment will have to be somewhat indefinite, because it relates to Temperance Flat or Friant Reservoir.

The Temperance Flat reservoir site is 6 miles farther upstream, and the river bed at that point is 85 per cent higher than the river bed at Friant, so

(Testimony of George E. P. Smith.)

that a dam at that point would only have 4500 acre-feet of dead storage, which is practically nothing, and it could be carried to almost any height, reasonable height; and the water authorities' report No. 29 shows that it was considered for storage up to a million two hundred thousand acre-feet, and the problem arises as to whether it could still be built, possibly with the sacrifice of use of Friant Reservoir for one year,—if there happened to be a big flood here it would probably take two years—and then parts of three or four years, other years, until the dam was completed.

But I do think it should be given consideration. And even Friant Dam might be built to a greater elevation, [1622] and the additional storage would be very considerable. [1623]

* * * * *

The Court: Then how much storage would a dam at Temperance Flat produce?

The Witness: Well, I would hope to produce a million eight hundred ninety thousand acre-feet of storage in Temperance Flat.

The Court: At what height dam?

Mr. McPherson: I didn't get that figure.

The Court: 1,890,000 acre-feet storage. At what height of dam?

The Witness: I don't know; whatever height it takes. The report No. 29 gives the area and capacity table up to 1,200,000 acre-feet, but when we get up to that height every additional foot adds a great

(Testimony of George E. P. Smith.)

deal of storage, so it would not be very much additional height.

The Court: You said a while ago that there would be 288,000 acre-feet available additional, each year, of water, [1624] if the three dams operated by the power companies were required to be kept to their full capacity up until January 1st. Did that include Kerckoff?

The Witness: Until July 1st. [1625]

* * * * *

The Court: I understand that your testimony is that building the dam at Temperance Flat would still permit the use of Friant Dam?

The Witness: I think some use could be made of it. Nearly all——

The Court: For storage, diversion?

The Witness: Both. Nearly all big dams, like Elephant Butte and Roosevelt, have subsequently, maybe 20 years later, had re-regulating dams built farther down the river. Shasta, for instance has Keswick re-regulating reservoir. Perhaps Friant reservoir could be put to some use of that sort.

* * * * *

Q. (By Mr. Rowe): Did you check the dropping of the water in the wells, and the situation of the well water, Professor?

Mr. McPherson: Where?

Mr. Rowe: At Tranquillity.

The Court: At Tranquillity.

The Witness: The District manager has kept records, and they date back to 1934. And the rec-

(Testimony of George E. P. Smith.)

ords show a [1633] constant lowering of the water table. [1634]

* * * * *

Mr. McPherson: May I ask a question so I can keep the record in my mind?

Is this document now marked for identification?

The Court: No. 87.

Mr. Goldberg: What is this other document that the witness is referring to?

The Court: He has not gotten to that yet. We are still talking about this, are we not?

Mr. Rowe: Yes. May that go into evidence? Mr. Miller is here.

The Court: I suppose counsel would wish to see it. It shows here, for instance, well No. 1, depth of the well is 1050 feet, the standing level on October 10, 1934 was 25.3 and the lift was 61.5;

May 25 to the 29, 1939, the standing level was 46.3 and the total lift 62.1;

August 15, 1939 the standing level is not given, the [1636] total lift is 89.9;

September 8, 1942, standing level 72.5, total lift 89.8;

July 22 and 23, 1947, standing level 83 feet, total lift 102.1;

On August 15, 1950, standing level 96, total lift 112.6.

Now that is one well. There are 11 wells.

* * * * *

The Witness: But the criterion is this, the water table keeps going down.

(Testimony of George E. P. Smith.)

The Court: That is what you call the standing level?

The Witness: Yes, sir. The trend doesn't matter how [1637] fast you are going toward Bakersfield, if you are going in that direction you will get there, and if you are pulling your water table down year by year you are headed for disaster, and I have seen that happen and they reached the goal. I know of many districts which are almost—and the people know it too——

The Court: The Supreme Court of Arizona knows it too.

The Witness: Yes, it has taken notice of that.

* * * * *

Q. (By Mr. Rowe): Based on your study of these various maps, Professor, in your opinion does the San Joaquin River main channel supply any of the underground water for the irrigation wells of the Tranquillity Irrigation District?

A. Yes, sir. [1646]

* * * * *

Q. (By Mr. Rowe): From your investigation of the Tranquillity Irrigation District, during the year 1952 how much water in acre-feet would all of the wells of the Tranquillity Irrigation District pumping from the underground safely pump?

Mr. McPherson: We object; incompetent, irrelevant and immaterial.

The Court: I think you have the whole ball of wax in one there.

Do you have an opinion as to whether or not the

(Testimony of George E. P. Smith.)

flow [1656] schedule as proposed for the year 1952 will or will not affect the ground water level in the wells of the Tranquillity Irrigation District?

The Witness: Yes, sir.

The Court: And northerly and westerly of the line which you drew on this 1950 map?

The Witness: Yes, your Honor.

The Court: What is that opinion?

The Witness: With the flow schedule as proposed by the Bureau for the future——

Mr. McPherson: Just a minute. There is no flow schedule for the future set up in this record today.

The Court: Yes, 1952.

Mr. McPherson: That is not the future. That is one year.

The Court: Well, this is only February.

Mr. Goldberg: He has already testified that that would have no effect this year.

The Court: My question did not confine it to a year, I just asked him whether or not he had an opinion as to whether or not it would affect them. Now I have asked him what his opinion is and he can state what it is or when it is or whether or not it will affect it.

Mr. McPherson: We renew our objection and assign the same grounds. [1657]

The Court: Your objection is overruled.

The Witness: The proposed schedule of flow will materially and very greatly reduce the contributions to the ground water supply both toward the southwest and toward the north from the river, not only

(Testimony of George E. P. Smith.)

down to Gravelly Ford but down to Whitehouse and down to Mendota.

The Court: Northerly of the line you have drawn on this map for 1950, Exhibit 88?

The Witness: Yes. We will say from Biola down to Mendota.

The Court: How will it affect it and when will it affect it? What will it do to it?

Q. (By Mr. Rowe): Professor, do you mean the line from Biola to Mendota? I asked about the Tranquillity Irrigation District.

The Court: He knows what the question was and the question was whether or not it was northerly of the line, and he said, yes, northerly of the line on the river from Biola to Mendota.

The Witness: The contribution from the river between Biola and Mendota will be very, very greatly reduced if the proposed flow schedule is carried out as compared with what it has been the last year and all past years.

The Court: By "very, very greatly reduced" what do you mean? Are you able to express that in terms of acre-feet of [1658] water recoverable in a given area such as the Tranquillity Irrigation District?

The Witness: I don't think that problem could be solved numerically, but my opinion would be that something like 80 or 90 per cent reduction in the contribution from the river to the ground water supply.

The Court: If that 80 or 90 per cent contribution

(Testimony of George E. P. Smith.)

from the San Joaquin River main channel were withdrawn, would it be replaced by water coming underground from the Kings River, or do you have an opinion on that?

The Witness: The water supply from the Kings River is already putting those people down there in jeopardy. On the 1948 map the 200-foot contour passed right through the township corner of Madera Avenue and Belmont Street. The next map, 1949, showed the 190-foot contour passing through that point. On the 1950 map it showed the 185-foot contour passing through that point.

That means the water table is going down, and while this year it is going to be a little up, and the water table may be maintained, may even be raised a little—I don't think it will be much for certain reasons—but beyond one or two good years I foresee another period, a long period of low rainfall, low flows and a continued decrease in the water supply, ground water supply, of the Fresno Irrigation District. [1659]

Mr. Green: I move to strike that portion of his answer as to what he foresees will be the amount of rainfall in the future on the ground that he is not qualified as a weather prophet in the future.

Mr. Reavis: On the further ground that this testimony seems to apply to the Fresno District, which I take it is not before this court.

The Court: Motion denied.

The Witness: The reason the water supply situation is getting tight is that more water is demanded

(Testimony of George E. P. Smith.)

by the farmers, more water is being used and more water is being used by the city. The stimulation of high prices causes more liberal irrigation, and there has been a change from crops which took very little water to crops that take a great deal more and some additional areas on the edges of the district have been put into cultivation, and this is shown very clearly by the fact that in the years 1941, '2, '3, '4, and '5—five years—the ground water table did not change very much, and at the end of the 5-year period it was exactly the same as it was at the beginning of the 5-year period. So we would conclude that the average annual water supply diverted from Kings River for Fresno Irrigation District was adequate, just right. That amount was 440,000 acre-feet per year.

But now it is not enough. Last year, 1951, they had just that amount of water, but it failed to hold the water [1660] table up. The water table sank two feet, and that represents about 60,000 acre-feet of water, 50,000 to 60,000 acre-feet of water, that they were that much short. That shows the change in conditions between the '41-'45 period and now.

Mr. Abererombie: I wonder if we might have a prognostication of how the fall elections will come out and what the Republicans might do and whether the farm prices will fall.

Mr. Rowe: I will give him one on the election.

The Court: I am sure it would be interesting, but I am afraid that Mr. McPherson's objection to that question would have to be sustained.

(Testimony of George E. P. Smith.)

Mr. McPherson: Not necessarily, your Honor.

The Court: Had you finished your answer?

The Witness: Well, part of the difficulty of the Fresno Irrigation District is the fact that the City is taking more water away from them constantly and the City, as was shown by Mr. Lee's exhibit on the cones of depression, the City just keeps two jumps ahead. I wouldn't call it a cone of depression, it is a bowl, a flat bottom bowl of depression. And the City—I have looked at the record—and City well No. 1 has lost in elevation of the standing water level from 40 feet below the surface 10 years ago to 62 feet now, and most of the loss has been in the last 5 years. In the last year they lost 4 feet, the year before that they lost 4 feet, the year before that they lost 3.5 feet. [1661]

The important thing is the trend. The population has increased from 60,000 people in 1940 to 90,000 people in 1950, and on that rate this population is now 97,000 people, and the city is growing rapidly and is going to be needing more water, and where is it coming from? Will it be by poaching on Fresno Irrigation District further?

Mr. McPherson: Where does it get it now?

The Witness: I beg your pardon?

The Court: Where does the water come from now? For the city?

The Witness: In large part it comes from the water brought in by the Fresno Irrigation District.

Mr. McPherson: When you said "trend," Pro-

(Testimony of George E. P. Smith.)

fessor, a moment ago you mean the continuous overdraft on the underground water supply?

The Witness: Yes, sir.

Mr. McPherson: That is what caused the trouble here now, isn't it, the overdraft?

The Witness: The overdraft.

Mr. McPherson: It is the primary cause anyway?

The Witness: Yes.

I don't know whether I understood him.

The Court: He says he does not know that he understood your question.

Mr. McPherson: The primary cause for the falling of [1662] this water table——

The Witness: Is the overdraft.

Mr. McPherson: Yes, sir.

The Witness: Yes, sir. [1663]

* * * * *

Q. (By Mr. Rowe): Professor, in the event Temperance Flat Dam was built to the capacity that you suggested, what would you do with Friant Dam? [1673]

* * * * *

The Court: The objections are overruled. Now you can answer. [1674]

The Witness: I stated yesterday that Shasta Dam, Elephant Butte, Pathfinder, Roosevelt and practically all great irrigation structures have been found subsequently to need a re-regulating reservoir below them on the river, and the additional dams that have been built sometimes 25 years after the

(Testimony of George E. P. Smith.)

original dam, but ultimately the re-regulating dams have been built and have been proven advantageous and profitable.

Q. (By Mr. Rowe): Professor, have you looked at the State's plan for physical solution?

A. Yes, sir.

Q. And do you have any comments to make on it?

A. I would like to comment on Table 3 in that plan. [1675]

* * * * *

Mr. Goldberg: May I ask at this time that this plan for physical solution on the part of the State of California be marked as the State's exhibit next in order?

The Court: It will be marked in evidence as Exhibit Cal-H.

(The document referred to was marked Defendants' Exhibit Cal-H and received in evidence.)

Mr. Goldberg: And I would like to file as part of this exhibit an errata sheet for page 80 on Tables 4 and 5.

The Court: What will that be, just substituted?

Mr. Goldberg: Substituted in lieu of page 18 as it previously appears.

The Court: What do you want to do, just paste it over this?

Mr. Goldberg: Paste it or staple it.

Mr. Ingerson has a stapler here and I am giving a copy of this to Professor Smith. [1676]

* * * * *

(Testimony of George E. P. Smith.)

The Court: Very well. I think there is a pending question of Professor Smith to the effect as to what his comments are concerning Table 3.

The Witness: Your Honor, I hope to show that this Table 3 lacks probity, that is Mr. McPherson's definition, and that it is contrary to human experience.

Mr. Green: Will the witness speak up a little bit?

The Court: He said, in Mr. McPherson's definition of probity, Table 3 is contrary to human experience.

Mr. Rowe: It lacks probity. [1677]

The Court: It lacks probity.

Mr. Rowe: The professor looked that word up and it is more insulting than Mr. McPherson ever intended it to be.

The Witness: In this table we have a study of the flow at Friant and at Whitehouse for the years '46, '47, '48, '49 and '50. Presumably allowance was made at the end of each month for the one or two days required in transit for the water from Friant to Whitehouse, and we note that after the data for the five years is given then we have the depletion average for the 5-year period for each month. In the first two months there was a gain showed by the negative sign and the rest minus signs except the last two.

The large quantities are in the spring and summer, the small quantities in the winter, and that is the depletion between Friant and Whitehouse.

(Testimony of George E. P. Smith.)

Now the next thing derived from that is depletion between Friant and Gravelly Ford, and that is obtained by subtracting 32 second-feet from each month. 32 second-feet was obtained from Table 4 on page 18, where the river was traversed from Friant to Whitehouse by two parties, each with a current meter equipment, and the stream was gaged at various places showing gains down to Riverview, but the two parties did not agree very well. There were wide divergencies, and that is not to be wondered at by anyone who is conversant with stream gaging with current meters, but it does show that [1678] the last column, the mean, has a pretty large probable error in each figure. That is, there should be a plus or minus sign after each one.

The last interval was from Gravelly Ford to Whitehouse and the loss is 32 second-feet, which of course is an approximation of what it truly was, but that was on October 4 and 5, probably October 5. [1679]

Now the loss between Gravelly Ford and Whitehouse is not constant through the year. The losses would be greater in the summertime when the temperatures are high and the water is warmer. It seeps faster when it is warm. The evaporation from the trees would be greater.

My objection is to using 32 second-feet as a constant quantity in the derivation of this tabulation of depletion between Friant and Gravelly Ford.

I would have said that since the total loss from Riverview down to Whitehouse is 75, the loss be-

(Testimony of George E. P. Smith.)

tween Riverview—I mean the loss between Gravelly Ford and Whitehouse would be 32/75ths of the total loss from Riverview to Whitehouse and then apply that through the summer months this ratio, or this fraction, 32/75ths, or about 45 per cent of the loss is below Gravelly Ford, and if that were applied it would make the losses between Friant and Gravelly Ford through the summer considerably smaller.

Now we come to the prize package. The author appears to have adopted the principle that if those quantities were lost between Friant and Gravelly Ford as an average through the years '46 to '50, those same quantities would be in the future or would have been in the past lost if the release from Friant had been only the very small quantities proposed.

Well, these same quantities, plus 5 second-feet which was to be the residue at Gravelly Ford, that is the thing that [1680] is contrary to human experience.

Feeling that these quantities would be lost even with the low flow is contraverted right here in Table 3 where it is shown up above that it took the large flows to create those losses while the small flows at the end of the year resulted in very small losses.

It is also controverted in Table 4 where it is shown that with 196 second-feet released at Friant, instead of having just 5 second-feet at Gravelly Ford the stream arrives there with 172 second-feet.

(Testimony of George E. P. Smith.)

It is also controverted by Mr. Christianson's table which has been put in the record, I think, in which he shows that with losses—I will only cite two or three of them—Mr. Christianson's table states that with the 200 second-feet flow the loss between Friant—in my notebook it says between Friant and Gravelly Ford would be 3 second-feet loss out of 200. I say loss. That is the depletion in Mr. Lee's testimony day before yesterday where he made the distinctions between the depletion and the loss. But Mr. Christianson on the stand testified that this table applies from Friant, it is for the losses between Friant and Temple Slough, and that the losses down to Mendota Pool would be 80 per cent of this, which would be in this case 80 per cent of 3, or 2.4, almost a negligible amount. Whereas in Mr. Christianson's table the loss for 1000 second-feet release at [1681] Friant is 76 second-feet and the loss for 2000 second-feet flow is 176 second-feet, and the depletion for 3000 second-feet release at Friant is 258.

My comment is that this assumption that is implied, and I believe it is stated in the context on the previous page, that these same quantities would be depleted from the stream if only those quantities, plus 5 second-feet, were released, my comment is that that conclusion is contrary to human experience.

Q. (By Mr. Rowe): Professor Smith, have you any other comments to make on the State's plan?

Mr. McPherson: I object to the question as in-

(Testimony of George E. P. Smith.)

definite, uncertain, calls for speculation and conjecture.

The Court: Overruled.

The Witness: No, sir.

I might add that it appears to be practically in exact agreement, very close agreement, with the plan proposed by the Bureau of Reclamation, with the addition of a few toy dams in the upper part of the river. [1682]

* * * * *

The Court: What do you mean "toy dams"? Do you mean by [1684] that that the dams would not perform the function which the State plan suggests they would?

The Witness: I think they would not.

The Court: Why?

The Witness: The opening is narrow, very narrow, the walls reaching back from the head walls of the opening are very weak and were designed to wash out with the first flood of any consequence, and I think they would wash out earlier than that perhaps if they are built of the sand and gravel similar to the dam built at the head of Gravelly Ford.

* * * * *

Q. (By Mr. Rowe): Well, Professor, would the State's plan make any substantial contribution to the percolating and underground water supply in the lands in the river bottom and on the bluffs adjacent to the river.

Mr. Goldberg: I object to that as being indefinite.

(Testimony of George E. P. Smith.)

The Court: Overruled. [1685]

The Witness: It would not make any substantial contribution.

The Court: Assume that the dams were built strong enough to impound the water and not wash out by an ordinary flow or the first flood. Would that make any difference in your answer?

The Witness: No, your Honor, because the dams have no collapsible gates and no opportunity to scour out the river so that if there were a long period without great floods the river behind each dam would silt up, the water from below each dam would be washed and carried downstream and would lodge on the upper side of the next dam, so that the river which normally seeks a smooth continuous course from the mountains to the sea would flow from one dam to another on a straight radiant and then would have a little drop, then it would flow again on a smooth constant radiant down to the next dam, where it would have another drop, and it would be a flight of stairs and there wouldn't be any ponding above for the purpose of aiding the river bank pump operation or for the purpose of increasing to a very big extent the seepage loss into the river bed as contemplated in the plaintiffs' plan. There would be none of this ponding. Instead it would be just a flight of stairs. [1686]

* * * * *

The Court: If the wings are washed out, or were

(Testimony of George E. P. Smith.)

washed out, would that affect the scouring out of the bottom of the fines which might be deposited there?

The Witness: Yes, I think so.

The Court: Would that not be the same result then as a collapsible gate?

The Witness: No, sir, because the collapsible gates would be operated and scouring accomplished at the same time when scouring is needed. On a year like 1938 the wings would wash out and it probably wouldn't be restored that year.

On other years, like 1931, when the flow was very low they wouldn't be washed out at all and the stream bed does need scouring out at intervals.

* * * ** [1688]

The Court: Or collapsible so that they could be manually operated. In other words, if the dams were built with a gate in them they could be manually operated.

The Witness: Yes, sir. I think then we would have virtually the plaintiffs' plan. [1689]

* * * * *

Q. (By Mr. Rowe): Professor, would the difference in height, the fact that the plaintiffs' dams are higher than those of the State's, would that make a difference in the amount of percolation?

A. That also has a bearing because the higher dams contemplated by the plaintiffs not only would spread the water much wider across the entire river bed even at points where it is 600 feet wide, but the additional head has an influence too—I say

(Testimony of George E. P. Smith.)

"head," I mean depth of water—has some influence on the rate of downflow into the sands, the intake.

* * * * * [1691]

Q. (By Mr. Rowe): Professor, what are your comments upon the Bureau's plan?

Mr. McPherson: Not to be facetious, but I don't know that the Bureau has any plan.

Mr. Rowe: The professor will agree with you on that, I think.

The Witness: I think it is a plan that is based on a concept so contrary to human experience that it is almost a fraudulent thing. I don't think that the people in this valley would believe——

Mr. McPherson: We can't hear a word he is saying, your Honor.

The Witness: My thought is that it is almost fraudulent [1695] to try to impose a plan which is so contrary to human experience.

The Court: What is wrong with it?

The Witness: As described here a few minutes ago, it is based on the concept that with 3000 or 4000 second-feet flowing in the river, 236 second-feet will be lost. Then if 236 second-feet is released on Friant everything will be lost except a little trickle which gets through at Gravelly Ford.

The Court: The plan does not propose the building of any check dams?

The Witness: No, sir.

The Court: It proposes some channel rectification. I think that is what they call it.

The Witness: Which is a very temporary ex-

(Testimony of George E. P. Smith.)

pedient and that would cause the Bureau itself a tremendous lot of trouble if carried out faithfully.

Mr. Green: Could the professor speak up a little? We can't hear you, Professor. Will you speak louder, please?

The Witness: The plan proposed by the Bureau officials, except for pump modifications and channel rectifications, provides for nothing except to maintain a flow of 5 second-feet at Gravelly Ford.

The Witness: Yes, your Honor.

The Court: Does it provide anything besides that?

The Witness: No, sir, your Honor. [1696]

The Court: I cannot find anything in it.

Q. (By Mr. Rowe): Professor, have you any comment to make——

The Court: What is wrong with that?

The Witness: With the State's plan?

The Court: No, the Bureau's plan. You say it is contrary to human experience.

The Witness: In our human experience we have found time and again that the depletion is related to the quantity flowing in the stream and the records along that line to establish that fact on the San Joaquin River are replete and have resulted in Mr. Christianson's tabulation which I think was based on averages over a period of years. [1697]

* * * * *

The Witness: Yes, sir. Here is the Bureau's plan. The Bureau's plan and the State's plan are very much the same except for the five toy dams.

(Testimony of George E. P. Smith.)

The Bureau would release those same small quantities at Friant through the various months of the year—— [1698]

* * * * *

The Court: Professor Smith, if 400 second-feet were released during July and August under the State's plan and the construction as proposed—let me withdraw that.

Assume that the State's plan were modified so that the dams had gates in them which would permit scouring out of the bed of the ponds or pools, and assume that there were [1702] five dams built in the river, would the release of 400 second-feet from Friant during the months of July and August, in your judgment, provide water in the river which would maintain the percolation and water levels in the wells along the river?

Mr. Rowe: Assuming these dams are two feet high as the State plans?

The Court: Assuming whatever height the State says, just with the change that I have suggested.

The Witness: They would not.

The Court: Why?

The Witness: Shall we discuss it first from the standpoint of the river pumps and then secondly from the standpoint of the recharge needed to maintain present water rights, presumed to be water rights in the Madera County and to the southwest.

As to the river bank pumps, they operate with a suction pipe emersed at considerable depth in the water so that air cannot be taken in, and the nem-

(Testimony of George E. P. Smith.)

esis of such an installation is drifting sand, and if a sump is required it needs almost constant attendance in normal conditions and in case of floods it would be filled with sand, and as the flood goes down it couldn't be cleaned out without endangering somebody's life, and of course sometimes one could wait another week before irrigating as previously intended but at other [1703] times one cannot wait a week. And the State's plan or the Bureau's plan will require constant watchfulness and attendance on the part of somebody to keep up the necessary channelization and the good operating conditions at sumps, and to me it does not seem at all practicable.

As for the second point, the Bureau's plan and the State's plan would reduce the intake into the deep underlying ground water supply probably 90 per cent from what it would be with a stream of 2000 or 3000 second-feet flowing all through the summer and 500 or 600 in the winter, and there is no provision anywhere that I have seen for making up that loss to the underflow. [1704]

The Court: Would a continuous flow of 400 second-feet in the river restore water to the aquifers within the cone which has been described by Mr. Lee?

Mr. Rowe: You mean without dams? I am not trying to interrupt.

The Court: With the five dams by the State.

The Witness: No, sir.

The Court: Why?

(Testimony of George E. P. Smith.)

The Witness: Because those dams would have very little influence in spreading the water laterally or ponding it. It will require dams 8 to 10 feet high to create the necessary ponding, back water, to obtain the infiltration commensurate with what has been accomplished by Nature in the past.

The Court: Then if dams were built 8 to 10 feet high with gates in them which would permit scouring and a flow of 400 second-feet maintained in the river throughout the year, would water be restored to the aquifers or would the water level be maintained in the aquifers within the cone described by Mr. Lee?

Mr. Rowe: How many dams?

The Court: Five.

Mr. Rowe: How high?

The Court: He said 8 to 10 feet high. And assume that they have a gate which will permit manual release for [1705] scouring at a predetermined time.

Mr. Rowe: Is that the number of dams that Mr. Lee has and their height?

The Court: No. The State proposes five dams. Prof. Smith just now said that because the dams were not 8 to 10 feet high they would not permit sufficient ponding.

I am now asking him to assume that there were five dams built at the points proposed by the State, that they were each 8 to 10 feet high, that each one had a manually operable gate in them to permit the release for scouring out of the ponds, and to fur-

(Testimony of George E. P. Smith.)

ther assume that there is a continuous flow of 400 second-feet in the river throughout the year.

Would that maintain the water level in the aquifers of the cone described by Mr. Lee?

The Witness: It would not.

The Court: Why?

The Witness: There are several reasons, one being that the opening of the flood gate or waste-way gate that you contemplate would not result in any scouring except for perhaps one or two hundred feet above the dam.

There would not be the essential scouring to clean out the accumulated silt and the algae without the release of a good slug of water from Friant Dam.

* * * * * [1706]

The Court: What modification, in your opinion, would it take in the State's plan to maintain the water level in the aquifers in the cones described by Mr. Lee, or what change?

The Witness: It would be more dams all the way to Gravelly Ford, higher dams, provision for cleaning as and when required, that would have to be determined in the future as to whether two cleanings in a year would be necessary, or six or seven or eight.

The Court: Dams with gates in them or a whole collapsible dam? I understood your testimony earlier this morning to be to the effect that if a gate were put in the dam, the scouring would result.

The Witness: No, not unless you hypothecate—a gate structure might have a good many gates in

(Testimony of George E. P. Smith.)

it, and in this case you would require a great many gates so as to give a big capacity, and then come down with a big slug of water which would tear out the riverbed at least to a depth of one or two inches, because the riverbed will absorb water initially at a high rate like those ponds, artificial ponds, described yesterday near Bakersfield, and then the growth of bacteria is inordinately fast and the reduction of flow staggered the engineers.

A biologist might have anticipated it, but the engineers did not. The flow is reduced so fast, so almost completely, that the scouring is necessary.

* * * * * [1708]

The Court: In other words, the ponds can be washed out in the wintertime just as well as in the summertime, if you have manually-controlled gates on the dams?

The Witness: Oh, yes. [1709]

* * * * *

The Witness: With, say, 12 dams and with the proviso that, if needed during the summer, one, two or three times at short periods slugs of water could be released. [1710]

The Court: By that you mean a flow of 2000 second-feet for a day or two days?

The Witness: Well, possibly 3000, 3000 to 4000, for 12 hours or 24 hours—24 hours, say. [1711]

* * * * *

The Court: I understood your testimony to be, Prof. Smith, that one of the faults of Friant Dam and Millerton Lake is that it is not capable of stor-

(Testimony of George E. P. Smith.)

ing sufficient water, and that that water is lost, as you termed it, from flowing over the dam and down the river, from above it.

The Witness: That is right.

The Court: That it is too small.

The Witness: Yes.

The Court: And by virtue of its being too small, there is a large amount of water that must be permitted to go over the dam and into the ocean.

You have estimated that—I haven't the figures—you estimated the amount of water flowing over the dam to be lost would be a very large amount of water each year?

The Witness: No.

The Court: No?

The Witness: No, not each year. I may illustrate that by stating the history of the Roosevelt Reservoir. The [1714] dam was completed in 1910, and I think it has been—has had a spill over it only four times.

Fresh in my mind is the situation in 1940, the end of a long drought period, particularly 1938, 1939 and 1940, had very small, low rainfall, and then in the fall of 1940 all the fish were taken out and hauled to Los Angeles and the riverbed was dry. In that one winter, the reservoir, holding twice the normal flow of the river, was filled to overflowing, and actually wasted a little water, not very much, over the spillway. That water was still being used six years later.

That is what we have to do, in order to keep our

(Testimony of George E. P. Smith.)

irrigated farms, and water, and that is what we call conservation. And we don't want any water to go to the ocean, even out of our biggest floods.

And here is the same thing. Your rivers are just as erratic in flow as our own. The San Joaquin has had flows only 24 per cent of normal, and they have had flows of double—about 200 per cent of normal, in the vicinity of 4,000,000 acre-feet per year, and with a small reservoir the wastefulness occurs on the years of higher rainfall, and rainfall being as illustrated in what happened a year ago, and what is happening now. [1715]

* * * * *

The Witness: The plaintiffs, your Honor, have attempted to suggest a substitution for the normal flow, which has provided water to the north and to the south of the river, and I think the plan of the plaintiffs is a minimum one. [1716]

* * * * *

The Court: Yes. The plaintiffs' original plan will be marked in evidence as the plaintiffs' exhibit next in order, which is 89.

(The document first above referred to was received in evidence as Plaintiffs' Exhibit No. 80.) [1720]

(The document last referred to was received in evidence and marked Plaintiffs' Exhibit No. 89.)

The Court: And the Bureau official's plan will be marked Exhibit B.

(The document referred to was received in evidence as Defendants' Exhibit B.)

* * * * *

Mr. Rowe: First, your Honor, Mr. Smith's testimony.

The Court: Yes.

Mr. Rowe: With the aid of Mr. Arnold of the University of Southern California, I have a very accurate description:

August 22nd, pages 869 to 989;

August 23rd, 913 to 1025;

August 24th, pages 1039 to 1056;

And August 24th, pages 1057 to 1138, all inclusive. [1721]

* * * * *

GEORGE E. P. SMITH

the witness on the stand at the time of adjournment, resumed the stand and testified further as follows:

* * * * * [1768]

Cross Examination * * * * *

The Witness: Your Honor, I did not testify on that point as to the influence of the San Joaquin River on the City of Fresno. Mr. Lee has studied the topographic maps; I have not. I have great difficulty in seeing red or brown, particularly the very fine brown lines on contour maps, and he has studied some two or three hundred logs of wells in the alluvial cone and I have not looked at them. I did not testify on the question of whether Fresno gets its water from the San Joaquin River.

* * * * *

(Testimony of George E. P. Smith.)

Mr. McPherson: Page 943. I just read it this morning. He has correctly quoted his testimony.

* * * * * [1783]

The Court: I mean, you took no other data into consideration, such as logs of wells?

The Witness: No. I reasoned deductively in many respects regarding portions of this area, but the line itself was drawn from a study of that one map, the ground water contour map of the Division of Water Resources dated 1948. [1784]

* * * * *

Q. (By Mr. Green): Professor, I will now show you a portion of Plaintiffs' Exhibit 73, which is the document—well, it is 73-B, "Lines of Equal Elevation of Ground Water Table in Upper San Joaquin Valley," fall of 1948.

I ask you if this is the map that you used in determining the position of that line on Defendants' Exhibit K.

Mr. Rowe: Do you mind if he uses his own copy of this same map?

Mr. Green: Well, so long as it is the same,——

Mr. Rowe: It is the same map. Is that the 1948 map?

Mr. Green: Yes.

Mr. Rowe: You have a '48 map there, have you not, Professor?

The Witness: Yes, I will have it in just a minute. Here it is. This is the map that I used.

The Court: Did you take one contour level of water and follow it through, such as 235 or——

(Testimony of George E. P. Smith.)

The Witness: Well, not exactly. I was looking more particularly at the slopes of the water table at each point, and in my mind I thought, I visualized the arrows of the direction pointing backward toward the source of the ground water.

Ground water does not move along in the direction, along [1786] a ground water contour, but at right angles to it, which means the line of steepest descent.

Mr. McPherson: He still hasn't identified his map.

Q. (By Mr. Green): Will you identify the map from which you determined this line, Professor? Do you have it in your hand? A. Yes.

Mr. Green: The legend on this map is, "State of California, Department of Public Works, Division of Water Resources. Line of Equal Elevation of Ground Water Table in Upper San Joaquin Valley, Fall of 1948."

Perhaps we had better given this an identification number, your Honor, because he has made some markings on it and I want to ask him about them.

The Court: Very well, that will be marked—what is the '48 map, Exhibit 73?

Mr. Green: 73-B.

The Court: The one in evidence?

Mr. Green: Yes.

The Court: All right, this will be marked 73-C, then. [1787]

* * * * *

(Testimony of George E. P. Smith.)

A. Well, the contours, I have made so many I know how they are made. They are sort of a compromise a good deal of the way along. A sag can be put into them, and that sag can be made deeper or shallower, and the evidence——

The Court: They are made by carrying a hypothetical line between two known points, aren't they?

The Witness: Yes, and sometimes we give more weight to one well than we do to another, because we know of the circumstances regarding the two. So it just—it gives you the rough solution. [1789]

* * * * *

Q. Now, I believe you testified earlier, Professor, that the water flows at right angles to the contours, is that correct? In other words, perpendicular to them?

A. Yes; but the water flows downhill, all right, but the contours are not always drawn exactly where they ought to be.

The Court: Flows at right angles to the contour, but not necessarily to the contour line; is that what you mean?

The Witness: Yes; yes, that is true.

Q. (By Mr. Green): Now, would you explain for me, Professor?

A. You start down across a series of three or four contours and feel very safe in your judgment, then you run up against a wall, and the next two contours seem to deny that. Finally it is reduced down to this: Shall I ignore these two contours, or

(Testimony of George E. P. Smith.)

down here shall I ignore something else that seems to have more weight?

Q. But, generally, you attempted to run them perpendicular or at right angles to the contour; is that correct?

A. That is the general rule and the general law.

Q. And you wouldn't run parallel to a contour, would you? A. No.

Q. Not in any instance? A. No. [1801]

* * * * *

Mr. Green: You are indicating the granite comes into Section 35, Township 11 South, Range 20 East, that we are speaking of, is that correct?

The Court: That is about 285-foot contour; is that correct?

Mr. Green: Yes, as indicated.

The Witness: The granite is visible in the river bed for about three miles below Friant, and that is just about the place. [1805]

Q. (By Mr. Green): In other words, Professor, in the granite, the river cannot contribute to the north at all, can it?

A. No, sir; but suppose the river—there is no vacuum in here, and suppose the river contributes down here (indicating), it will back up and fill in; in the course of 10,000 years you would get a slope from the foot of the——

Q. It would back uphill, Professor?

A. Well, you couldn't have a pond or pool back in there, a depression back in there.

Q. Would it back uphill, Professor?

(Testimony of George E. P. Smith.)

A. (Continuing) Because the river water can move laterally, through the gravels and formations, that would be through the Friant formation, and it moves very slowly in that, but it would——

Q. Let me see if I understand you.

A. The final effect would have to be a slope from the foot of the granite outward toward the valley. There would be very little change in the water there from one year to another. There would be no outflow and no inflow to speak of, because of the tight formation. [1806]

* * * * *

Q. And from that point, it is your testimony that the water leaves the river and flows parallel to the underground water contour for a distance of six miles, instead of running downhill; is that correct? [1807]

A. No, I didn't use the words "flows northerly." It seeps so slowly that it might take a thousand years to go that five miles, but that is kind of dead storage in there, dead water.

* * * * *

A. ——Friant series, as the Bureau's geologists call it, or the early Pleistocene material, as I would call it, is a very dense type, and it would not permit of a good well, or any well to speak of, more than a house well or even a good house well, perhaps, close to the hills there. [1808]

* * * * *

A. I wouldn't want to be any more definite than to say [1814] that the influence of the river on the

(Testimony of George E. P. Smith.)

ground water supply to the south begins at some point between Biola and Herndon, varying from year to year depending on whether the river carries a million acre-feet in that year or 3 million acre-feet or 2 million acre-feet, and depending on the contributions by the Madera Irrigation District.

Q. By the Fresno Irrigation District, you mean?

A. Fresno Irrigation District. And depending upon the time that the Fresno Irrigation District has its water supply.

* * * * *

Q. Now above this point, Professor, between Biola and Herndon, that fluctuates in year to year, above that point the water flows from the Fresno side into and under the river, does it not? [1815]

A. We think so.

* * * * *

The Witness: Well, your Honor, I don't go back very far in my studies. I do go forward. I think a great deal about the future, but I really began my work with the conditions as they existed in 1948.

* * * * * [1816]

Q. (By Mr. Green): Professor, getting back to the base that you used in determining the location of the area that is supplied by the San Joaquin River for its underground replenishment, is the method you used a standard and accepted method among engineers? A. Oh, I think so.

Q. Is there any other method that is used as often as the method you have used?

A. I don't know of any. If anyone depends

(Testimony of George E. P. Smith.)

absolutely [1829] on the contours and nothing else they run into contradictions which have to be solved in some way. Then you look for all the attendant circumstances and go back in the history, the rainfall and runoff of streams, and try to find explanations.

Q. Can you name any other method that is used besides the method that you used to determine the area which will be recharged from a stream in the underground water? A. No, sir, I cannot.

Q. That is the only method you know of?

A. Yes.

The Court: That is the study of the ground water levels?

The Witness: That is the study of the ground water table and ground water supply. They go together.

The Court: What about the geology and the aquifers, the imperviousness of formations on the river and the granite?

The Witness: That is a part of the study and must be utilized as far as possible.

Q. (By Mr. Green): Is it reflected by the slope?

A. As a rule, we don't know quite as much about the underground formations and the aquifers as we would like to, but we should certainly use them where we can.

Q. Is the geology of the ground reflected by the slope of the ground water? In other words, if there is an impervious area, would it show on the ground water maps? A. Yes, sir. [1830]

(Testimony of George E. P. Smith.)

Q. And if the ground water maps show a direction of flow, as you have said, which is perpendicular to their lines, does that indicate that there is pervious material through which the water will flow? A. (Pause.)

Q. Let me reword my question, Professor. Perhaps I am not clear.

If the ground water map indicates a slope of ground water in a given direction, may you deduct from that that the ground water is flowing slowly in the direction toward which it is sloping?

A. That is the first assumption, because it would flow downhill unless there are other matters which controvert that.

Q. For example?

A. Well, now, take this bank which I spoke of as the bleachers on the side of a football field, we know from other considerations (logs of wells, for one thing, and yield of wells) that the Madera formation reaches down to the railroads, and I infer from the position of the tight contours that run roughly parallel to the railroads, I infer that at the level, 50, 60 feet below the surface of the ground, or whatever it may be, the Madera formation reaches down to approximately the foot of the slope of those tight lines——

Mr. Abercrombie: Is that the Friant or Madera formation? [1831]

Q. (By Mr. Green): Are you speaking of the Friant formation or the Madera formation?

A. Of the Friant formation.

(Testimony of George E. P. Smith.)

Q. Friant formation at Madera?

A. In Madera County.

Q. Now did you in this case find anything which would indicate that the water would not flow in the direction that the ground water table slopes? In other words, that the water would not run downhill?

A. Now take this broad valley, 10 or 12 miles wide——

Mr. McPherson: Where?

Q. (By Mr. Green): Which broad valley?

A. From the foot of the slope indicated by the close contour lines, which lines run northwest and southeast, then from there over to the river, that is what I call the broad valley or plain, and where the contours are rather wobbly or crooked, and I ascribe that to pumping, and uneven draft of the pumps. But taking them as a whole, you see there are about a dozen of them, and mentally smoothing them out, we have a series of contours that cut downstream and which are practically at right angles to the contours in the bleachers back on the northeast side.

The Court: Did you have any information as to the depth [1832] of the wells which are indicated to lie in these various areas, and I take it were the wells from which the contours were made, when you made your study as to the depth of each well?

The Witness: No.

The Court: Did you have any information as to whether or not they all reached the same geologic formation?

(Testimony of George E. P. Smith.)

The Witness: I did not and, of course, that is something to worry about.

The Court: Something else to worry about?

The Witness: Yes, sir, and it would be very valuable to know, but I knew the logs of a few wells, some in the region about six miles due west of Madera and some down on the Columbia Canal, and I had the logs of all the Gill wells—there must have been 25 of them—and they are on a large area, I think.

Q. (By Mr. Green): Along the Aliso Canal are they not, Professor?

A. I think they reach up to Gravelly Ford.

Q. Now, Professor, with the exception then of the variations in the contour lines in what you call the flat lands which are north of the river and down where the water contours are further apart, did you find anything tight during this trial, either through geologic study or examination of profiles, logs of wells, or anything else, which would indicate any other area in which the water, the flow of the [1833] underground water, did not follow its slope as delineated on the underground water contour maps?

A. No, I think not. [1834]

* * * * *

Q. (By Mr. Abercrombie): Professor, this is the map in the fall of 1940, is it not?

A. This is the condition which prevailed——

Q. At the time these contours were drawn in the fall of 1940, whenever that was?

A. ——for a great many years up to 1947, and

(Testimony of George E. P. Smith.)

it is my contention that with the increased use of water this map will never be repeated.

Q. Exactly. Now you put your finger on the thing that I asked you to start with, Professor.

The overdraft, the increased use of water, is the thing which caused the divide to move over to where you drew your red line yesterday?

A. Acreage has increased, the use of water is now more liberal than it used to be because of the increased agricultural crop prices and because of the change from vineyard, which took less water, to cotton and other things which take more.

Q. Exactly. As you point out——

A. And also because the major single user of this [1868] ground water supply, the City of Fresno, has grown very rapidly, 50 per cent in 10 years.

Q. Just a minute, Professor. Let's stay on this ground water divide that we are talking about down here so we won't get confused.

Now you have pointed out, which I believe I understand, that this overdraft brought about in large part by economic conditions, such as $40 a ton for alfalfa and hay and 40 cents a pound for cotton, which has caused people to increase their acreage planted and to move to those crops which bring high prices, all add up to make a heavy draft on the ground water and move that divide to where you placed it yesterday.

A. The same thing goes for the succeeding maps up to 1948.

Q. And substantially the same condition as ex-

(Testimony of George E. P. Smith.)

isted in the 1940 map, which I have pointed out to you, Plate 7, existed in that year in 1943, Plate 8? A. Yes, the same thing. [1869]

* * * * *

A. Well, there are at least a half dozen theories as to the formation of hard pan, and I haven't yet learned of any theorist who would accept any of the other theories.

Q. What is your theory?

A. In our state there is a hard pan which we call by another name, Caliche, and it is white instead of red. It has a lime calcareous binding, whereas this has siliceous and feringinous binding. * * * * * [1871]

The Witness: It is so impervious it creates a perched water table, a water table below and a water table on top of the hard pan, where too much is applied in irrigation.

The Court: Where too much is applied in irrigation, it can create what you call a "perched water table" above and below? [1872]

* * * * *

Q. (By Mr. Abercrombie): I mean the soil maps don't use the term "Friant Series": they call it "San Joaquin," do they not? [1874]

* * * * *

Q. (By Mr. Abercrombie): Now, Professor, this Friant series which you mentioned is the cone of the river laid down as you have described in early Pleistocene times into which the river has since

(Testimony of George E. P. Smith.)

entrenched itself in its upper reaches, the Friant series?

A. Yes, sir. At the end of the first glacial period, cycle, the advance and retreat of the glaciers meant the entrenching of the river not necessarily where it is now but approximately somewhere in the vicinity, and then the deposit of the great fan which Mr. Lee calls the Ancient fan—fan, cone or delta, but fan is a good name for it, or cone, either one, they are synonyms——

Q. Excuse me. Before you pass that, when was that fan or Ancient cone laid down, Professor?

A. Well, between counting the Pleistocene period as about 800,000 years——

Q. In other words, the Ancient cone was laid down somewhere around 500,000 to 800,000 years ago, the so-called Friant series?

A. No, sir, about 600,000.

Q. About 600,000?

A. We will say it was finished off about 550,000 years ago.

Q. Very well. Now that is the fan into which the river [1877] has since entrenched itself as you have described, digging a deep trench then backfilling to the present bottoms?

A. In the second episode the present trench was made and at the end of that second cycle or second glacial period the refilling did not reach the top until, being on flats greater than the fan, it did reach the top in the vicinity of Herndon.

(Testimony of George E. P. Smith.)

Q. And laid down what you call the Modern cone?

A. And then spread out and made the Modern fan, which is not too modern since it is perhaps 350,000 years old. After that there were two more cycles during which the river could not get out of its trench.

* * * * *

Q. Professor, isn't it true that ancient cobbles, that [1878] is, ancient geologically, tend to become cemented? A. No, not necessarily.

Q. Age has nothing to do with that?

A. They may or may not. It depends. In our well logs we find maybe 10 feet of cemented gravel. All right. We go on down 20 feet and the next aquifer of coarse material may be 12 feet of open, porous gravel, making a good aquifer. We find those in the same well repeatedly. [1879]

* * * * *

Q. Well, whatever the maps show, Professor; you have looked at them, and you have testified now that since 1947 the Tranquillity District receives water from the San Joaquin River.

A. The slope of the water table now is from the San Joaquin River directly down to the Tranquillity District, the slope of the water table. [1889]

* * * * *

A. I have known all of that except Bull Slough. I thought Buena Vista was an internal drainage, centrifugal drainage and had no outlet. All right.

(Testimony of George E. P. Smith.)

Mr. Rowe: I would object to that as stating something not in evidence.

The Court: He has answered. He says that he did not know about Bull Slough.

Mr. Rowe: I don't either.

The Court: He thought that Buena Vista Lake was a centrifugal drainage—you say?

The Witness: Centrifugal. [1892]

* * * * *

A. Taking as a model the cone as delineated and introduced in Plaintiffs' Exhibit 30, taking that as a model, the Kings River likewise had a broad cone increasing its width as the distance from the mouth of the canyon increased, and the Kings River at various times occupied all parts of that cone, and I have no doubt, just speaking at random, that [1897] that course may have come almost as far to the east as Kerman. I can't say that definitely. But it was a broad cone for the Kings River is almost as important in quantity of discharge as the San Joaquin.

Q. Now, Professor, the Kings River in point of elevation is a higher river than the San Joaquin River, is it not? For some reason it hadn't entrenched itself like the San Joaquin? A. Yes.

* * * * *

The Witness: Piedra is within the canyon a few miles.

The Court: When it leaves that canyon and comes out onto the plain on that side, how much above the San Joaquin River as it leaves the mountains at Friant is the Kings River?

(Testimony of George E. P. Smith.)

Mr. Rowe: I object to the court's question as assuming [1898] something not in evidence. They are the same, I think you will find, if you will look at the map.

The Court: Are they the same? He just said that it was higher.

The Witness: Higher than——

The Court: Than the San Joaquin?

The Witness: I think that one should ask somebody who can examine the topographic map. This map does not show it.

The Court: You do not know?

The Witness: This doesn't show it. [1899]

Q. (By Mr. Abercrombie): Now, you don't know then, I take it, Professor, you haven't made any study to determine what stream, whether it was the Kings or the San Joaquin, laid down the deposits underlaying this impervious blanket which I call the Corcoran clay in the area of the Tranquillity Irrigation District?

A. Oh, I think a dozen streams contributed to that at different times.

Q. I asked you, have you made a study of it?

A. Why, that is just general knowledge. Nobody could know for sure just where any particular stratum came from, because the materials that are brought out of the Kings Canyon are the same, practically, granite detritus, and including, of course, fine sands and silts, which one can tell, from its nature, are from the basic granite and basic complex.

(Testimony of George E. P. Smith.)

No one could determine exactly where — which river brought down any particular stratum, but at times the junction of the Kings River and the San Joaquin River could have been near Kerman, or a little south of Kerman. At other times, the Kings River might be a way over on the south side of its fan, and the San Joaquin could be nearer to the north side of its fan.

Q. "Could be"; do you know? I asked you whether you made any study to determine.

A. I surely wasn't there. Nobody knows. [1900]

* * * * *

The Witness: My opinion is that each river, from time to time, changed its course during the upbuilding of the fan. It would fill up one trough and move over to another place; so that all the ribs of the fan of the Kings River were occupied, from time to time, by the Kings River itself, and that fan is probably maybe six or eight miles wide.

The Court: Did it overlap the San Joaquin fan?

The Witness: It couldn't in this vicinity, because the fans of the little creeks came in between, the Dog Creek and Dry Creek, Fancher Creek. Those little fans would intervene; but farther to the west—these little fans are short, they don't go down; they have been built up so slowly, because all the material they get doesn't come from the granite, it comes from the foot' ls, and therefore the Dry Creek fan, for instance, during the last 600,000 years, since the San Joaquin has been in a trench, Dry Creek fan has kept on aggrading, and therefore it has reached

(Testimony of George E. P. Smith.)

over onto the previously built San Joaquin fan, and the true divide between the San Joaquin fan and the Dry Creek fan is south of where it is [1901] shown on the surface, the topographic map merely showing the divide as of now; but the Dry Creek has kept building up its fan and intruding over onto the San Joaquin fan. [1902]

* * * * *

Q. Then let me ask you this: Is the inter-fingering of edges of cones conducive of good aquifers through that area where the inter-fingering takes place? A. Is it conducive?

Q. To good aquifers, yes, and does it tend to retard the flow of water?

A. No, generally speaking it tends to—you wouldn't find good aquifers there generally speaking, and it tends to—has a tendency to seal off one cone from another. [1904]

* * * * *

A. Yes, sir; and if two feet depth of water could be re-charged to the ground water table, it would be —it would mean a rise of about 14 feet. [1920]

* * * * *

The Witness: Your Honor, I would say, in answering your question, it would certainly take in Sanger but how far north of that, two or three miles perhaps north of Sanger—— [1958]

* * * * *

I am told that in the Fresno Irrigation District there are 5000 pumps. I asked how far apart the wells are, and they said every 40 acres has one as a

(Testimony of George E. P. Smith.)

rule, and the pumping is the latter part of the season, July, August and September, and that warps the ground water table a great deal. In our discussion so far we haven't considered that at all.

The Court: In this area?

The Witness: Yes. [1959]

* * * * *

Mr. McPherson: Read him the question, Mr. Reporter.

(The question referred to was read by the reporter as follows:)

("Mr. McPherson: * * * If, as you say, based upon that map and the information that is contained on it, you are not able or capable of drawing the northern boundary of the influence of the Kings River to the underground water supply, isn't the converse true and that you cannot draw the southern boundary of the influence, if any, of the San Joaquin River, and for the same reason?")

Mr. Rowe: On any given area? In one area there are ditches, and there are surface diversions, he said, in Madera County.

Mr. Child: We object to that. Let's have an answer. [1960]

The Court: I think the question is a legitimate question.

The Witness: Shall I answer it?

The Court: Yes.

The Witness: Well, your Honor, I wasn't able to satisfy myself with respect to the boundary, the

(Testimony of George E. P. Smith.)

eastern boundary of the area influenced by the San Joaquin River which lies west of Kerman until I made two trips out there one a Tuesday and one a couple of days later, and gathered quite a good deal of additional information, and I am satisfied in my mind now as to the location of that north-south line which passes about two and a half miles west of Kerman.

I am very unfamiliar with this area and I do not want to express an opinion without close study. It might l[illegible]ite erroneous. [1961]

* * * * *

Q. (By Mr. McPherson): Will you be good enough, sir,——

May I have the State's plan of physical solution as it was offered in evidence?

I show you, Mr. Witness, a plate purporting to reflect the line of equal elevation of ground water table for the year of 1948, being a part of the Cal-H State Plan of Physical Solution, and ask you to take your black pencil, if you will, and draw the line of divide as it would be suggested in those contours, and indicate in the record where, if at all, it contradicts the 1950 county-wide map.

A. The line of divide as indicated on this map (indicating)?

Q. Yes, if there is any.

A. I don't need to draw it. It is already drawn. I agree with it. It is perfect. I would give them 100 per cent. [2018]

* * * * *

(Testimony of George E. P. Smith.)

Q. Then I understand you to say that, between those two points, this effect on the water table of the direct application of the Fresno Irrigation District water is reflected north of the San Joaquin River by these contours?

A. It is reflected in the river flow——

Q. I am not asking about the river flow, Professor, and, please, I don't want to argue with you.

I asked you a direct question. Will you say "Yes" or "No"? A. I will say no.

Q. That is what I want you to say.

Will you point on the map, any one of the three you have before you, and indicate which it is, any point between the City of Fresno and the San Joaquin River where the slope of the water table is not north and toward the San Joaquin River?

A. May I—is it a proper time to explain my answer now?

Mr. McPherson: Answer my question, please.

The Court: Do you want to explain your previous answer?

The Witness: The last answer.

The Court: You may explain your answer.

Mr. McPherson: This is the answer "No," that there is no effect north of the San Joaquin River, is that it? [2024]

The Court: Yes.

The Witness: The San Joaquin River skims the surface of the water that, without that river valley, would flow across the trough of the San Joaquin Valley over into Madera County. That ground

(Testimony of George E. P. Smith.)

water would percolate without that trough there, in a northwesterly direction, and in quantity to be determined by the slope of the water table and the character of the materials. But since the river is there, it skims off any surplus and carries it downstream, and it is such a small quantity, as shown by the traversing of the river last October 4th and 5th, that any quantity of that water that would get over into Madera County underground would be negligible. [2025]

* * * * *

Q. (By Mr. McPherson): All right, sir. Beginning in 1900, you became a professor in the University of Arizona; correct? A. Yes. [2031]

* * * * *

Q. Now specifically in connection with your preparation to testify in this case as an expert on the influence of the San Joaquin River on the underground water supply, as a part of your preparation for your testimony here did you read either in its original form, in an excerpt or any other place the information which is contained in Exhibit 76?

The Witness: That is Exhibit 76?

Q. Yes. A. No, sir.

Q. When were you employed to make the investigation on which you have given your testimony in this case, and by whom?

A. I was employed in the spring of 1900 by Mr. Claude L. Rowe.

Q. Spring of 1900? A. 1950.

(Testimony of George E. P. Smith.)

Q. In the course of the preparation which you made for your testimony here, did you give any consideration to the influence on the underground water supply from the main channel of the Kings River?

Mr. Rowe: I will object to that.

Mr. McPherson: I object to counsel interrupting.

The Court: As distinguished from what? [2038]

Mr. Rowe: That is assuming something not in evidence as yet.

The Court: As distinguished from what?

Mr. McPherson: I don't distinguish it from anything. I think the question is entitled to an answer in the form in which it is put.

The Court: Read it again.

Mr. Rowe: The main channel.

The Court: That is what he said.

Mr. Rowe: I will object to that as improper cross examination.

The Court: Why is it improper cross examination?

Mr. Rowe: The main channel of the Kings River, as far as I know, has never been brought up on direct examination of this witness. It is no more material than if we went down to the Kern River or back there to Florida where counsel comes from and get one of those rivers.

The Court: The objection is overruled. Whenever you put an expert on the stand you open the

(Testimony of George E. P. Smith.)

door as wide as the field on cross examination. Your objection is overruled.

Read the question again.

(The question referred to was read by the reporter as follows:

("Q. In the course of the preparation which you made for your testimony here, did you give any consideration [2039] to the influence on the underground water supply from the main channel of the Kings River?")

The Witness: At the very outset of the investigation I observed that the area south of Lanes Bridge near which our clients live——

Q. (By Mr. McPherson): Who are your clients?

The Court: Let us see. We are jumping back and forth. You asked him that before and you did not finish that question. Now we are on this one.

Mr. McPherson: He told me who employed him before. That is all I wanted to know.

The Court: Very well.

Mr. Rowe: I am his client.

The Court: Let us keep on the question.

Mr. Rowe: Not the Bureau of Reclamation, Professor.

The Court: I did not hear that.

Mr. Rowe: I say there is one thing certain, I don't think he will have the Bureau of Reclamation as a client.

Mr. McPherson: You may be very sure of that.

Mr. Rowe: And you can ask the professor why.

The Court: The question was, and the question

(Testimony of George E. P. Smith.)

is, whether or not you gave any consideration to the influence on the underground water of the main channel of the Kings River to [2040] area of land involved between the Kings River, I suppose, and the San Joaquin River.

Mr. McPherson: Yes, sir, and westerly to the Fresno Bypass.

The Witness: Yes, sir. I observed immediately that the influence of the Kings River water brought overland through canal systems——

The Court: He is not talking about that; he is talking only about the underground.

Mr. Rowe: The main channel.

The Court: The main channel of the Kings River.

The Witness: I didn't think the question was limited to that.

The Court: It was limited to that.

The Witness: Well, answering it on that basis——

The Court: In other words, Professor, I suppose that one of the factors that I must take into consideration is what existed in the state of nature here before there were any canals or overground system or irrigation systems.

The Witness: Well, as to the effect of, we will say, seepage into the river bed along the Kings River channel——

The Court: No, his question is whether or not you gave any study to that.

The Witness: Yes.

(Testimony of George E. P. Smith.)

As to that matter, of course it was a possibility, something [2041] to think about, but I eliminated it immediately as not affecting my problem.

Mr. McPherson: Not affecting what, sir?

The Court: My problem.

The Witness: My problem was the problem of water rights and the hydrology of the San Joaquin River.

When I got down to Tranquillity in January of this year, one of the inquiries that I made was with relation to the Kings River in that region and Fresno Slough and the by-pass slough, and the sources of water for those, and the times of the year, the general hydrology of that district, which did not have very close relation to the hydrology of the Kings River near Sanger or near about the mouth of the canyon. Otherwise my interest in the Kings River direct has been very little.

I made one trip to the Pine Flat Dam about the middle of February, middle of last month, and did it with my eyes open both going and coming to catch all the information available. But I have not been making a close study of the Kings River except as the source of the Fresno Irrigation District water supply. [2042]

Mr. Rowe: This gives me an opportunity, doesn't it, if the court please, to go into the Bureau's operation of the Pine Flat, and what the Professor thinks of that?

The Court: Mr. McPherson is still cross examining.

(Testimony of George E. P. Smith.)

Q. (By Mr. McPherson): Is that all the consideration you gave to the seepage flow, or the underground flow from the main channel of the San Joaquin—or of the Kings River? A. Yes, sir.

Q. Now, Professor,——

The Court: That is until last night, when you said you deliberated upon the lines which maybe somebody will ask you to draw. If they don't, I will.

Q. (By Mr. McPherson): Professor,—this is a difficult subject for me and if the question is not intelligible to you, just abuse me like a pickpocket, because I don't know very much about what I am talking about — if I understood you correctly, in your direct examination you stated that the channel seepage or percolation was a direct function of the flow of the stream. Will you tell me what you mean by that?

A. I don't think I used those words. Maybe—it sounds more like Mr. Lee.

Q. I apologize to you, sir.

A. Sometimes when you say "a direct function," it implies [2043] that the seepage would vary, as the first power of the flow. But that isn't necessarily true. I have never thought of reducing the relationship to a formula. I have been very content to accept Mr. Christian's tabulation showing the relationship, and based not on any deduction by theory, but by observation, study of the data.

Q. Is that all, Professor? A. Yes, sir.

Q. Now, you stated a moment ago, and I want to be sure I understand you, that you did not con-

(Testimony of George E. P. Smith.)

sider the Kings River flow, the main stream at least, to be involved in your problem.

Now, I understood you to say that your problem was the water rights of the people in connection with or in relation to the San Joaquin River; is that correct?

A. I said the water rights and the hydrology.

Q. Professor, did you have any hand or any part in the preparation of the plaintiffs' plan for physical solution that has been filed in this case?

A. Very little.

Q. What? A. Beg pardon?

Q. What part did you play?

A. I helped develop the general facts on which our case depends, through the summer of 1950 and through August of [2044] last year, but following my departure in August I had no further hand in it.

Q. Do you agree that the primary function of such a plan of physical solution would be for the protection and preservation of existing water rights so far as physically possible?

A. I think, if I understand your question, I would say yes.

The Court: You have examined the plaintiffs' proposed plan of physical solution?

The Witness: Yes, sir.

The Court: And are familiar with it?

The Witness: Yes, sir.

Q. (By Mr. McPherson): Was one of its pur-

(Testimony of George E. P. Smith.)

poses to protect these water rights which you say were part of your problem? A. Yes, sir.

Q. What did you assume those water rights to be?

A. To have their water supplies available to them. The riparian owners should have the water supplies available to them in quantity and manner as they were accustomed to.

Q. Is that the extent of your understanding of the water rights that you were employed to protect?

A. Yes, sir. [2045]

* * * * *

Cross Examination * * * * *

The Witness: The fact, however, that they are so erratic [2048] and are based on the conditions that exist as of one date, and because we know that, at least believe, that the one if not the major cause in the location of the trough is the pumping, which was variable, I do not think of these, a trough as so labeled in 1951, as being supersanct, and to be thought of as the location of the trough, say, in February, when floods are running, or—— [2049]

* * * * *

Q. (By Mr. Green): Now, Professor, if the trough exists at all times of the year, will there be any recharge to lands lying northerly of that trough, for their underground water supply, from the San Joaquin River? In other words, will the water flow down into the trough from the San Joaquin River, then climb the other side and flow out of it?

(Testimony of George E. P. Smith.)

A. Even—your question is about as broad as it is long. The influence is not only crosswise of the trough, but it is diagonally crosswise, or it has a component toward [2050] the west as well as toward the north, northwest; and the trough may be best thought of as one of those holes.

I assume that the hole isn't there during a large part of the year.

Q. No, Professor, you did not take my assumption. My assumption was that if the trough exists during the entire year, then will any water flow from the San Joaquin underground northerly of that trough?

A. You would have—in a general way, my answer would have to be no, but in consideration of the sources of water available to the region, we can assume the channels that are flowing, that would carry the river water westerly and northwesterly direction, reaching across the channel, across the trough; and I would never allow myself to be bound down by the location of the trough without the possibility of modification or influence crosswise of it. [2051]

Q. Now, Professor, if water is to flow underground from the San Joaquin River across the trough, or beyond the trough line, it can only flow through a confined aquifer beyond that line, is that not correct?

A. Water flows in aquifers more rapidly.

Q. I am talking about a confined aquifer, Pro-

(Testimony of George E. P. Smith.)

fessor. You understand what I mean by a confined aquifer, do you not? A. Yes, sir.

Q. In other words, it must be an aquifer that has no horizontal connection with the free body of underground water that we are speaking of, is that not correct?

A. Yes, what we call the water table.

Q. The free water table. Now in the study that you have made of the San Joaquin River, have you found any indication of such a confined aquifer?

A. We find them in logs of wells in Madera County in the vicinity of Gravelly Ford, with very thick beds of clay. I have a good many logs of wells in Fresno County further upstream, but except for the bottom land wells I haven't any on the high ground in Madera County until we get out of Gravelly Ford. [2052]

* * * * *

A. I did not make a close enough examination of that, but I think the state in getting its water level measurements in December attempts to use the water level in shallow wells, but where there is not a shallow well available they use a deep well with some compunctions because the water level in the deep well is likely to have a different pressure and to give a different water table from what they would get if the measurement were in a shallow well. [2054]

* * * * *

Q. (By Mr. Green): Did you find any well, Professor, above Gravelly Ford north of the most

(Testimony of George E. P. Smith.)

northerly trough line on Plate 12 which showed a confined aquifer?

The Court: Plate 12 of Cal-H.

Mr. Green: Thank you.

Q. ——which showed a confined aquifer leading from the [2055] San Joaquin River or supplied by the San Joaquin River?

A. I did not have any information which would show a yes or no. The log of the well very rarely gives the height of the water table, and even at that you have to have it in a particular day in order to compare it with water levels in other nearby wells for that particular day. The water levels are restless and changing all the time, and my study was of the materials particularly. I was trying to see how much porous aquifer material was available in the different parts of the area studied.

Q. But you did not find such a well?

A. I was not looking for such a well. That was not in my mind. I might have had the log of such a well in my hand but I would not know it. [2056]

* * * * *

The Court: Now do you have any opinion as to whether or not there is any percolation from the main bed of the San Joaquin River southerly or southeasterly between Friant and the point that you have indicated as the line between approximately west of Herndon and San Joaquin? Is there any percolation south from the river?

The Witness: Between Friant and a point to the west of Herndon?

(Testimony of George E. P. Smith.)

The Court: Where you have drawn your line.

The Witness: Somewhere to the west of Herndon?

The Court: Yes.

The Witness: We do not have any indication of it.

Mr. McPherson: I can't hear you, sir.

The Court: He said, we do not have any indication of it.

That is under present operating conditions?

The Witness: Yes, sir. [2091]

* * * * *

The Court: I have been sitting here by the witness now for several days, and the witness has difficulty with his eyesight and where he points with his pencil, I have seen him talk about Sanger and point to Madera. [2094]

* * * * *

The Court: The record will also show that the witness has a great deal of difficulty seeing, and I have seen him point to one place and talk about another. In fact, Mr. Green has had to take and guide his finger occasionally. [2095]

* * * * *

Mr. McPherson: May I suggest, your Honor, the witness actually legended the line he is speaking of, on the map, without any assistance of Mr. Rowe?

Mr. Abercrombie: That is above the "A-A" line, Mr. McPherson.

Mr. McPherson: I understand that.

The Court: I know where he pointed.

(Testimony of George E. P. Smith.)

Mr. Rowe: Malaga.

The Witness: Shall I draw the line?

The Court: If you are prepared to do so. And this is the line of a trough?

The Witness: It develops into a trough.

Mr. Abercrombie: It wasn't a trough he pointed to, your Honor; it was a ridge.

The Court: I have heard you say that at least half a dozen times. It has absolutely no weight with me where you say he pointed, because, Mr. Abercrombie, I have seen the witness time after time pointing at different places. If you leave the witness alone and let him draw his line, and give him a chance to look and see, we will see what he means.

* * * * *

The Court: When we recessed last night I had asked Professor Smith to take the '48, the '49 and '50 maps and put on whatever divides and troughs the contour intervals showed between the Kings River and San Joaquin. [2109]

* * * * *

The Court: Now in connection with the collection of water in underground pools, what I had in mind is this: Suppose that there are 640 acres and there is an impervious bed of clay down 250 feet and there are impervious lenses at the side, would water collect there in an underground pool that would be available and not escape from that, or would it flow eventually and find a lower level?

* * * * *

The Witness: * * * Now that trench was eroded

(Testimony of George E. P. Smith.)

a long time B.C. and very much deeper than is indicated by looking at the valley now, and that has been refilled and it has been eroded again and again, three times since the trench was formed. The materials in that are so much younger than the Friant series, using the geologic name "series," very different from a soil scientist series, so we now have a fill, a narrow fill, from a half mile to a mile and a half wide, the upper I think about 50 feet of which is very pervious and the materials beneath are much less pervious but confined within the walls of the Friant series into which the water can percolate, but it does not move with anything like the freedom that it does within the Pleistocene material of the valley floor or beneath the valley floor. It is a matter of degree. [2118]

* * * * *

The Court: The water table north and east of Fresno will go down because it drains into the river, is that what you mean?

The Witness: If we let the water table fall in the river bottoms it immediately increases the drainage from the Fresno Irrigation District and will allow the waters that are valued by the Fresno Irrigation District to escape by way of the San Joaquin River. [2124]

* * * * *

I drew a line from the Lanes Bridge to the court house in Fresno. That line passes a half mile east—it has to pass over the crest of the big ridge, ground water ridge, built up by the canals of the Fresno

(Testimony of George E. P. Smith.)

Irrigation District. My line crosses the top of that ridge a half mile east of Pinedale. The water level at Lanes Bridge as shown by the river gage, the gage is between the old bridge and the new bridge, is 262 feet above sea level. The elevation of the water table at the court house here, or rather one block east of the City Hall, is 235 feet. Where that line crossed the ridge in 1946 the elevation of the water table was 295 feet.

A year later——

The Court: That is half a mile east of Pinedale?

The Witness: Yes, sir.

A year later at that same point the water table was at 293 feet above; in 1948, 290 feet; in 1949, 285 feet; in 1950, [2125] 281 feet; in 1951, last December, it was 275 feet.

That is falling mighty fast and it should give the people of this city something to worry about because, as Mr. Lee has pointed out, the cone, the bowl which has been created or made by the city of Fresno's pumping, has reached pretty nearly the top point already.

Now 275 feet is only 13 feet higher than the river surface at Lanes Bridge. Three years more at the rate of five feet a year will make the water level on that ridge practically the same level as at Lanes Bridge and with the population use of water increasing, the lowering is not going to stop there.

* * * * *

The Witness: At the outset the depth of water has a very important effect. The water, flowing

(Testimony of George E. P. Smith.)

water, has a forward movement varying as the square root of the head or number of feet causing the flow, but underground the flow varies as the first power, that is, if you double the head you double the flow and——

Mr. McPherson: I can't hear you.

The Court: You double the head, you double the flow. [2137]

* * * * *

Cross Examination * * * * *

Q. (By Mr. Abercrombie): Now, you don't mean the court to understand by that that these maps you examined and used here, the maps prepared by the State of California, are not of value in determining the trends of ground water conditions, do you?

A. No. I have had five men at a time employed in making just such maps, and they certainly have taught us many, many lessons of tremendous value.

Q. Well, they are of particularly great value, are they not, in that this particular series of maps have been maintained [2157] over a period of 30 or 31 years? It shows you the trend, does it not?

A. Yes, sir. I don't wish to imply that the State Supervision Department has not done a very good job. I think they have done as well as possible.

Q. Or that the maps as done are not of any value in aiding you or anyone else in determining the ground water conditions in the area?

A. Yes. [2158]

* * * * *

(Testimony of George E. P. Smith.)

Redirect Examination * * * * *

Q. (By Mr. Rowe): Let's take a release of 200 second-feet at Friant, continuously, and forgetting the alfalfa, how many second-feet would come out at Gravelly Ford, 5 second-feet or how many?

A. With a release of 200 second-feet?

Q. Yes.

A. We believe that 200—about 185 second-feet would appear at Gravelly Ford. [2162]

* * * * *

The Witness: The error is in table 3 of the State's plan. That table starts with the tabulation of stream flow measurements at Friant and Whitehouse, and the depletion between Friant and Whitehouse month by month over a five-year period; the averages made for each month, and then an insufficient quantity subtracted from the month-by-month depletions, [2164] Friant to Whitehouse, to get the month-to-month depletions Friant to Gravelly Ford, and then the assumption is made that if that much water is released at Friant, we will say 200 second-feet in July, the assumption is made that because the depletion was 200 second-feet during July of the year, when the flow was large, that that 200 second-feet will be adequate to keep up the supply, the ground water supply, with its numerous drafts upon it, without the flood conditions, without the large flow, merely the small flow released is going to sink into the river bed, because that amount did

(Testimony of George E. P. Smith.)

sink in when the flow averaged four or five hundred feet wide and six to ten feet deep. [2165]

* * * * *

My conscience will not be clear unless I add something which has been in my mind a long time, and that is this statement: For the San Joaquin Valley, which needs to stop the exhaustion of the ground water supply, and not only stop it but build it back up 50 feet or 100 feet in many cases, a long-period undertaking, now what is the best way to get water underground? We have found that it is difficult by artificial means to put water underground.

What is the best way to put water underground? It is to cease taking the water out from underground, and substitute gravity water for irrigation in place of starting the pumps [2169] every morning.

If I were a director of Madera Irrigation District, I would fight for the purchase of 3 acre-feet of class 1 water per acre of irrigated land, so that practically, then, nearly all the land needs could be satisfied with the gravity water, and the underground supply at least would not be depleted any more. What is left of it could be reserved for the years of terrific strain, like 1931 and 1934 and 1924. And although the Madera Irrigation District has purchased some class 2 water, they are not very fast about taking it, and I cannot see why. The cheapest thing in the San Joaquin Valley is good irrigation water at $3.50 an acre-foot. It is cheaper than your needles and pins that you buy; and any district

(Testimony of George E. P. Smith.)

that goes on exhausting the 10,000-year supply of accumulated ground water, instead of taking Friant water, of which, as Mr. McPherson said, there is more to sell than the demand calls for, I think that district needs a new board of directors. [2170]

* * * * *

The Witness: I have stated this, that the best way to store water underground is to substitute surface water for [2171] the pumped water. But, in addition, there are various ways in which some water can be put underground, and those methods should be utilized to the limit. [2172]

* * * * *

Recross Examination * * * * *

Q. (By Mr. McPherson): Is there any difference between your understanding and position with respect to the effect on the lowering of the water table in the city of Fresno as Mr. Lee's, as is reflected on this exhibit?

A. Your Honor, I have not studied that.

* * * * *

I made a statement at the beginning of the cross examination Tuesday morning that I have not studied the contour maps and the boundaries of the alluvial cone, or I have not studied over 200 well logs collected by Mr. Lee and the city on which Mr. Lee's hypotheses are all founded, that is, his study of the structure of the alluvial cone. [2179]

* * * * *

A. I think my answer—I don't think you need to look it up. I think my answer would be that the

(Testimony of George E. P. Smith.)

city acquires now, and has under the conditions of the last 10 years anyway, acquired more than half of its water from the Kings River. I [2188] think that is a safe statement.

* * * * *

Q. Professor, I asked you the other day if you were familiar with the Grunsky report. Assuming Mr. Grunsky's report was correct, and that before surface application was made in the Fresno District of the Kings River water, the [2189] table here stood at 60 to 75 feet—I believe you said 75 feet and he said 60 feet underground,—— [2190]

* * * * *

The Witness: * * * I think of the city at that time as being in the center of a great trough, with a little water supplied to it from Dry Creek, and larger quantities coming in from the San Joaquin and the Kings River, and I can't estimate it quantitatively. The water from Kings River and the water from San Joaquin might meet in the vicinity —in a line drawn through the courthouse, or some line drawn north of there; but that is as definite as I can be.

Q. Will you give me, sir, the authorities you read or from which you determined that the water level was 75 feet below the surface, so we will know what we are talking about?

A. 75 feet below the surface?

Q. You said you read something in the early days.

A. I was sitting in the office with Mr. Rowe, and

(Testimony of George E. P. Smith.)

he telephoned to the Fresno City Historian; and I don't know the name. He can tell you.

Mr. McPherson: I know who he is. If that is the person you got the information from, I know who he is. [2191]

* * * * *

Recross Examination * * * * *

Q. (By Mr. Goldberg): Would the State's plan of physical solution, in your opinion, adequately provide for the land within the bluffs?

A. No, sir.

Q. It would not? A. No. [2196]

* * * * *

CHARLES H. LEE

recalled as a witness by and on behalf of the plaintiffs, having been previously duly sworn, resumed the stand and testified further as follows:

Direct Examination * * * * *

Q. (By Mr. Rowe): Now, Mr. Lee, you have prepared some subsequent exhibits and graphs based on Plaintiffs' Exhibit 80? A. Yes.

Q. Did you use Plaintiffs' Exhibit 80 on these subsequent graphs for the years '45-46 and for the years '50-51?

A. No, those two years were not used.

Q. Will you tell the court why?

A. During these years the discharge was large during the summer and there was overflow from the channel of the river above Whitehouse Gaging

(Testimony of Charles H. Lee.)

Station so that there was no means of getting the total flow of the river at the lower station. There were sloughs above the gaging station where water broke over the bank. So for that reason I did not use those two years.

Q. But that condition did not exist for the years '46-47, '48-49 and '49-50? A. That is right.

* * * * * [2215]

Q. (By Mr. Rowe): Assuming the continuation of what has existed during the last 10 years in the Fresno Irrigation District, in your opinion will the seepage losses from the Fresno Irrigation District continue?

A. The trend has been on the decrease. The quantity of that return water from the Fresno Irrigation District has decreased from year to year. The point at which loss from the river on the Fresno side begins has been moving upstream during the past four years.

There is also within the area of the Fresno Irrigation [2256] District a lowering of the water level in the wells indicative of the extraction of more water from the area than comes in, and that is the pumping from wells constitutes drainage, so that the water level is continually lowering from year to year. And with that lowering the elevation of the water table above the river level is decreasing so that as a final result the return water into the river is decreasing as it is indicated by the actual measurements on the river itself.

The progress of that decrease is fairly rapid in

(Testimony of Charles H. Lee.)

recent years, and I can easily visualize within the reasonably near future a diminution to a point where there will be no water, no foreign water, in the San Joaquin River. It will be natural flow only for such water as comes from the natural watershed of the San Joaquin River.

Q. And you have drawn another chart to indicate that condition, the seepage when there is no flow from the Fresno Irrigation District into the river?

A. Yes.

Q. Now going back to the flow from the San Joaquin River, or the Fresno Irrigation District into the river, assuming 40 second feet comes from the Fresno Irrigation District into the river, does that immediately jump across the river and 40 second-feet rush out into the Madera Irrigation District, or what happens to it?

A. No, 40 second-feet of flow entering the river from [2257] the Fresno side would flow down the river and would gradually seep out of the banks where the level of the water table was at a lower level than in the river and would progressively be lost to the Madera side until it reached the point where seepage was occurring on the Fresno side and then it would go on both sides.

Q. Now assuming——

Mr. McPherson: You mean the whole of it or some of it?

The Witness: I don't recall what Mr. Christian said.

Q. (By Mr. Rowe): Did he say, assume 40 sec-

(Testimony of Charles H. Lee.)

ond-feet seepage into the river from the Fresno Irrigation District got back out into the surrounding land or a portion of it?

A. It would depend on the circumstances of the day and of the moment. That couldn't be answered categorically.

Q. Would it depend upon the flow of the river?

A. Yes.

Q. The size of the flow?

A. Yes, the flow of the river and various other conditions.

Q. Assuming that the 40 second-feet flow from the Fresno Irrigation District made a total in the river of 200 second-feet, would you state how much of that would get over into the Madera side?

The Court: Where would it come in? [2258]

Mr. Rowe: It drains in.

The Court: I know, but——

Mr. McPherson: 200 second-feet at what point?

The Court: Would it come in at one point or all along the 20 miles or 15 miles or the first 10 miles?

Mr. Rowe: I think I am getting far afield.

The Court: No, you are not. Maybe I am.

Q. (By Mr. Rowe): Mr. Lee, assuming just for the purpose of an assumption that 40 second-feet came into the San Joaquin River from the Fresno Irrigation District side at Friant Dam, and there was a flow of 160 second-feet at Friant Dam, making a total starting at Friant Dam seepage and a natural flow down the river of 200 second-feet—assuming a total flow of 160 feet out of Friant

(Testimony of Charles H. Lee.)

and 40 out of the Fresno Irrigation District roughly how many second-feet from the 40 second-feet would get over into the Madera and Fresno sides as percolation?

A. The question assumes that this both enters at Friant?

Q. At Friant. A. About half of it.

Mr. Child: What?

Q. (By Mr. Rowe): I mean what amount of the 40 second-feet, not the [2259] total.

The Court: Well, whether it is the amount of the 40 second-feet, what amount would be lost in seepage of the 200 second-feet?

Q. (By Mr. Rowe): Of the 200 second-feet, what amount would be lost?

A. The question would have to also include, is there any other seepage coming in anywhere?

Q. No.

A. About 21 second-feet would be lost.

Q. So if you allocated the 21 second-feet to the 40/160 that would be about 4 second-feet of the seepage from the Fresno Irrigation District that would get out into Fresno and Madera Counties?

Mr. McPherson: I don't think that that follows at all. I don't mean to argue with you, counsel, but that is not what I understood the witness to say.

Mr. Rowe: I believe the court can figure that out.

The Court: I cannot figure that one out.

Q. (By Mr. Rowe): Mr. Lee, you stated that there would be a seepage loss of 21 second-feet in the 200 second-feet. Of the 21 second-feet, how many

(Testimony of Charles H. Lee.)

second feet could you attribute to the 40 second feet from the Fresno Irrigation District?

Mr. Child: What time of the year? [2260]

Mr. Rowe: We will get into that.

The Court: I think that is a fair request. That assumption should be in there, the time of the year, because by your charge here it gets——

Mr. Rowe: All right.

Q. In July, Mr. Lee.

A. What was the question, Mr. Reporter?

(The record referred to was read by the reporter as follows:

("Q. Mr. Lee, you stated that there would be a seepage loss of 21 second-feet in the 200 second-feet. Of the 21 second-feet, how many second-feet could you attribute to the 40 second-feet from the Fresno Irrigation District * * * in July, Mr. Lee?")

The Court: How can you tell it is that 40 second-feet or 21 second-feet that came from there or the 160 that came out of Friant? How are you going to identify a drop of water?

Mr. Rowe: I will bring that out.

The Court: Very well.

Mr. Child: I move to have an answer to the first question.

The Court: That is, the opinion question?

Mr. Child: That is right.

The Witness: I am afraid I am in no position to judge.

Mr. Rowe: I still think I can make it clear.

(Testimony of Charles H. Lee.)

Q. We assume 40 second-feet flows in from the Fresno Irrigation District at Friant and 160 out of Friant Dam. That is a flow of 200 second-feet——

Mr. McPherson: At Friant?

Mr. Rowe: At Friant.

Mr. Child: In July?

Mr. Rowe: In July.

Q. Would the loss be approximately 21 second-feet between Friant and Whitehouse?

A. Approximately.

The Court: By seepage?

Q. (By Mr. Rowe): By seepage?

A. Approximately.

Q. Well, then, by simple arithmetic, I mean there is no difference, assuming no difference in the quality of the Fresno Irrigation District water and the water out of Friant Dam, how many second-feet would you say out of the 40 second-feet from the Fresno Irrigation District would go into seepage?

The Court: 10 per cent of the whole is lost, so then it would be 10 per cent of 40, would it not?

Mr. Rowe: Yes, or 4 second-feet.

The Witness: Yes. I can answer it that way. I didn't quite catch the question. [2262]

Q. (By Mr. Rowe): So, Mr. Lee, you have made assumptions, or you have made studies as to the total seepage in the Fresno Irrigation District, have you not? A. Yes.

Q. And approximately what is the seepage from the Fresno Irrigation District?

(Testimony of Charles H. Lee.)

Mr. McPherson: When?

Q. (By Mr. Rowe): During the average, during the year.

Mr. McPherson: Where?

The Witness: It has varied from year to year. I have made studies of conditions from year to year.

The Court: Do you have it compiled there? Do you have a chart?

The Witness: No, your Honor. I have it in the form of rough notes which I can testify from.

The Court: Very well. What did you do and what did you find?

The Witness: In the period December 1, 1936 to December 1, 1937, in the State Report—I think it is No. 11—I have noted a record of it, I mean in that exhibit which is in this case (I have forgotten the number) I have noted the record of computations based on measurements to determine the contribution from the Fresno side. [2263]

Two methods were followed, one known as the inventory method, which is a summation of volumetric inflow and outflow, resulting in an average for that period of 49 second-feet; and as a check upon that method the method of salt concentration was used, that is, observations were made of the salt content of the river water that came down from the water shed of the San Joaquin River and of the salt content of the water from the Fresno District before it entered the river, and from that computation a determination was made of an average

(Testimony of Charles H. Lee.)

of 46 second-feet. Those are averages for the year. One method gave 49 second-feet and the other 46 second-feet.

Q. (By Mr. Rowe): In which years?

A. That was December 1, 1936 to December 1, 1937. And the average of the two values is 47½ second-feet which I considered to represent the amount of return water average for that year and as of that time from the Fresno Irrigation District.

The Court: That is, under the conditions of flow in the San Joaquin River, condition of diversion and introduction of water into the Fresno Irrigation District system?

The Witness: Yes, your Honor, subject to all those conditions.

The Court: And subject also to many of the wells that [2264] were then pumping?

The Witness: Yes.

The Court: In other words, all of the factors which you have been taking into consideration?

The Witness: Yes, your Honor. Those would all be operative. It would represent, according to the method used, it would represent the integration or summation of all of those factors. It is the final product.

It does not, however, indicate variations that there may be during the year, that is, during certain periods of the year when the return water is greater, it might be greater, and then in another period it might be less.

The Court: 47.5 second-feet daily?

(Testimony of Charles H. Lee.)

The Witness: Yes, but it is an average for the whole year.

The Court: An average for the whole year of 47.5 feet daily?

The Witness: 47.5 feet per second.

The Court: Second-feet?

The Witness: Yes. It doesn't need the day but every second there would be 47.5 cubic feet flowing throughout the year average.

Q. (By Mr. Rowe): That would be 96 acre-feet a day? A. Around 95, I would say.

Q. Now going back to my original—— [2265]

The Court: Do you mind if I ask this question while I have this thought in mind?

Mr. Rowe: No, your Honor.

The Court: You testified that the tendency is for less.

The Witness: Yes, your Honor.

The Court: And you have based that upon similar studies, that is, data and information secured from official sources?

The Witness: Yes, your Honor.

At the next date at which specific measurements were made, which I had available, was in February, February 1st and 3rd of 1950. At that time observations were made by a current meter in the river on those two days, measuring the flow at Friant gaging station and at other points down the stream progressively, and those measurements were made by the United States Bureau of Reclamation, and a copy of which was sent me. I have photostated

(Testimony of Charles H. Lee.)

copies here made of the letter of transmittal and of the data, of which I have a copy here.

Mr. Rowe: I will now introduce those. I am kind of jumping the gun on you a little bit, Mr. Lee.

The Court: I was inquiring into the matter. What I am getting at is that he has testified that it would be less and that the tendency is less.

What causes that?

The Witness: The extraction of water from wells in the Fresno Irrigation District in greater amounts each year with [2266] a resulting lowering of the water table in the Fresno Irrigation District and the diminution of the head available for pushing the water into the river.

The Court: And less water into the river?

The Witness: Well, at times that might have some bearing on it. That would be a temporary condition, however.

The Court: If there was no water in the river at all between Friant and Whitehouse, would there be a greater flow into the river from the irrigation district?

The Witness: There would be for a time while the bank storage was draining out, but when the bank storage had drained out I think it would resume its normal or its preceding——

The Court: Cycle?

The Witness: Where it was before. That is, as the river dropped there would be drainage out of

(Testimony of Charles H. Lee.)

the bank storage. Then when the river was completely dry——

The Court: Suppose it was dry for two years, not a drop of water introduced into the river between Friant and Whitehouse?

The Witness: There would be a greater rapidity in the lowering of the wells on the Fresno District side because of the absence of the feeding of pressure and the feeding into the lower aquifers so that the pumped wells which caused the water to drop more rapidly so that there would be in time an [2267] accelerated decrease of it.

The Court: There would first be an increase in the flow in the water table leveled off?

The Witness: Until the water tables in the bottoms in the river leveled off, that is, the bank drainage had drained out. That might take a period of two or three months.

Then following that there would be a diminution in pressure head in the river which would cause diminution in the feeding into the deeper aquifers.

The Court: By the river?

The Witness: By the river, so that the pumping from wells in the Fresno District would extract water more rapidly, or rather I should say cause the water to drop more rapidly because of its being replenished from the river as rapidly in the deeper levels.

Mr. McPherson: By "deeper levels" you mean what depth, Mr. Witness?

(Testimony of Charles H. Lee.)

The Witness: I think below the level of the water table in the river bottoms.

Mr. McPherson: You mean 500 feet or a thousand feet, or what?

The Witness: Well, the bluffs range in height from 80, 90 feet to 50 or 60 feet, so that the water at the river bed level would be about 100, from 75 to 100 feet.

The Court: Let me see if I understand you correctly [2268] then.

Assume no water was in the river at all for a year or two years, three years, any period of time, say one or two years that there was none; your testimony is that at first there would be an increase flow into the river or the aquifers under it?

The Witness: Into the river.

The Court: From the Fresno Irrigation District?

The Witness: Yes. It would be bank storage. Some of it would have been water that had got'en into the banks from the river previously, and some of it had been accumulative.

The Court: I am not thinking of the bank storage. All I am thinking of is water from the Fresno Irrigation District. Your testimony is that ultimately even though there were no water at all in the river the flow into the river from the Fresno Irrigation District would be less than it has been under the circumstances that you have indicated for the year '36-37 and currently?

The Witness: Yes.

(Testimony of Charles H. Lee.)

The Court: And that is because, if I understand you correctly, the pressure from the water from the river would be withdrawn which would cause the wells in the Fresno Irrigation District to have greater depths and seek water at greater depths and reduce the water table?

The Witness: Yes. [2269]

The Court: So that the water would not be available then to flow into the channel of the San Joaquin?

The Witness: That is correct.

The Court: Has anybody—I was trying to relate the other day the bottom of the river bed with those lines of equal elevation of water at various points in the State's plan. You gave me sea levels and at certain points but I couldn't identify them on those maps at all. In other words, someplace along the line I hope somebody will tell me the level of the river bed.

Mr. McPherson: We have some graphs that we will offer which show that. As a matter of fact, all of the points which we will ask you to consider.

The Court: For instance, the 295 foot level, what is the level of the river bed where it crosses over or enters the river?

Mr. Goldberg: In the State's plan, your Honor—I don't have the plate numbers——

Mr. Rowe: There is a river bottom profile that you can tie it into.

The Court: I could not tie it in. I tried to tie it in because it says six miles down the river the sea

(Testimony of Charles H. Lee.)

level is so-and-so, then so many miles down the river it is so-and-so. But I could not tell from those maps how far down the river profile map 289 or 290 feet was. [2270]

Mr. Goldberg: The water level contour maps show the distance down the river. There is a little number there showing that.

The Court: I know they do, they show it in miles or at miles, but they do not show them—there was a lot of argument and cross examination by Mr. Green on the north side of the river at the 275 to 280 foot contour, and I could not find on my map any place the height above sea level of the river bed at that point. Yes, I can find six miles down the river it is so-and-so, and so many miles down the river it is so-and-so, but not at that particular point.

Mr. Green: It is below that point.

The Court: How do I know?

Mr. Green: The only way that I came to that conclusion was on the exhibit that shows the riparian lands. It shows the number of miles down the river. Then you get the number of miles down the river and you go to the State plan and that shows you the height of the river bed at so many miles down the river.

The Court: But that is just at that mile.

Mr. Green: Yes.

The Court: I did not have any scale here and the river is crooked, it winds. I can take section lines and count them, but I cannot tell how many

(Testimony of Charles H. Lee.)

miles down the river a 300 foot line will be on that map. [2271]

Mr. Green: It is difficult, I will admit.

Mr. Rowe: Mr. McPherson says he has the answer to that.

The Court: You do?

Mr. McPherson: We have that in preparation. We expect to show the respective heights of the stream below in the river bed and the other observations which we will ask you to compare with throughout the area.

The Court: Including the bed of the river?

Mr. McPherson: Yes. I said the bed of the river as well as the level of the flow of the stream at different stations.

The Court: And these lines of equal elevation?

Mr. McPherson: And the underground water table.

The Court: Very well.

Mr. Child: Doesn't Plate 2 in the State plan answer that inquiry?

Mr. McPherson: Before we get back to that last question that your Honor put—I have a little delicacy in putting it—you interrupted the witness' testimony, the procedure is new to me, and I don't understand whether we are to consider ourselves bound by your interpretation of it or not. I did not so understand the witness. I understood him to attribute this fall in the water table in the Fresno Irrigation District, as did Professor Smith, to be the result directly of an overdraft. [2272]

(Testimony of Charles H. Lee.)

The Court: My question was — I was not concerned with the fall of the water table in the Fresno Irrigation District — the question was, how much water flows out of the Fresno Irrigation District into the channel of the San Joaquin.

Mr. McPherson: Yes, but in the factors which you had him consider or interpreted him as having considered, you did not name, as he did in his examination in chief, the overdraft on the water supply in the Fresno Irrigation District.

The Court: That is the thing that he did name.

Mr. McPherson: If he did, I missed it.

Q. (By Mr. Rowe): Mr. Lee——

Mr. Green: Mr. Rowe—excuse me just a moment —getting back to the court's question, I think a comparison of Plate 2 and, for example, Plate 7, all in the State's plan, may give the court what he was looking for.

The Court: Maybe that is one I did not see, but I certainly tried to compare them all.

(Examining documents.)

No, that does not. I can find out where it is at point 6 miles, yes, but if I want to find it out in between those points, some other mile here, I cannot.

Mr. Goldberg: It shows 8 miles.

The Court: Yes, 2 miles down the stream. But suppose I [2273] want to find the level of the river in between?

Mr. Goldberg: This gives it by individual miles.

(Testimony of Charles H. Lee.)

The Court: That is right, but suppose I want to find it in between there?

Excuse me for the interruption, Mr. Rowe.

And while I am interrupting everybody, did Mr. Wheaton finally get paid by everybody?

Mr. Child: He got paid by us.

Mr. Rowe: He got paid by us.

Mr. Goldberg: I don't know if the State has paid him or not. I sent his bill in.

The Court: Mr. McPherson, how about you?

Mr. McPherson: The Wheaton check would go directly to him, it would not come back to me. I approved his voucher quite some time ago.

The Court: Very well. Will you look into that, Mr. Goldberg?

Mr. Goldberg: I have no more way of knowing than Mr. McPherson, but I will look into it because his check would go to him direct.

Mr. Rowe: I will call Mr. Wheaton and find out and report back.

The Court: Very well.

Q. (By Mr. Rowe): Mr. Lee, now assuming a flow from the Fresno Irrigation [2274] District of 47 second-feet as shown by Report No. 12, and assume that went in right below Friant Dam——

The Court: Report No. 12?

Mr. Rowe: Is that the one that you referred to?

Mr. McPherson: No. 11.

The Witness: Report No. 11.

The Court: Let me see Report No. 11.

(Testimony of Charles H. Lee.)

(The exhibit referred to was passed to the court.)

Q. (By Mr. Rowe): Assume 47 second-feet flowed into the Fresno Irrigation District and 153 feet was flowing out of Friant Dam, making a total of 200 second-feet, how much of that 40 second-feet from the Fresno Irrigation District would ever percolate out into the underground water supply?

Mr. Green: Objected to as asked and answered, with the exception that we are now talking about 47 and 153, while a few minutes ago we were talking about 40 and 160.

Mr. Child: It is the same thing.

Mr. Green: It is the same thing.

Mr. Rowe: I was taking the State's report now and applying it to this water.

The Court: Would not the same percentage apply, Mr. Lee?

The Witness: On a total of 200 second-feet, yes, sir. If the total was 200 second-feet, it would.

Q. (By Mr. Rowe): That would be a flow from the Fresno Irrigation District back out away from the river of about 4.7 second-feet?

Mr. Goldberg: I don't understand that 4.7 feet.

The Court: It would be about 10 per cent, roughly, that is, assuming a total flow of 200 second-feet.

Would your figures change if the flow was 2000 second-feet in the river and 40 second-feet came in from the district?

The Witness: The percentage would change, yes.

* * * * *

(Testimony of Charles H. Lee.)

Q. (By Mr. Rowe): Mr. Lee, you just stated the figure 47 second-feet from the Fresno Irrigation District was in the year, I believe, 1936. [2281]

* * * * *

The Court: All right. Now you were going to interpret Exhibit 101.

Mr. Rowe: And 102.

The Court: And 102, yes.

The Witness: Yes. For this purpose I made a tabulation of the essential data from each of those series of measurements, and I have that tabulation here, which would aid in giving the comments which I have, if they were available to the court and counsel.

Mr. Rowe: May that be marked 103 for identification?

The Court: Very well.

(The document referred to was marked Plaintiffs' Exhibit No. 103 for identification.)

The Witness: On this tabulation, which is headed "Summary of Depletion Measurements, San Joaquin River—Friant to Whitehouse," the first sheet, "U. S. Bureau of Reclamation, February 1-3, 1950," and the second sheet, "State [2292] Division of Water Resources, October 4-5, 1951."

It is to be noted that the measurements made in February, 1950, were after water had been out of the ditches of the Fresno Irrigation District for a number of months, so that return water would presumably be at a minimum; whereas the measure-

(Testimony of Charles H. Lee.)

ments made by the State in October 1951 were at the—just at the end or a little after the end of the irrigation season, and would presumably be much greater, the return would be much greater, than it would be in February earlier in the year.

I have tabulated on the first sheet of this Exhibit 103 the data from the Bureau tabulation, giving in the first column the station name, then its miles below Friant; the third column, the discharge as measured by the current meter and reported; fourth column, pump diversions as noted and reported; next, the discharge less pump diversions; next column gain; next one, loss; and the final one, gain or loss per mile.

Now, in inserting the measurements made by the Bureau, the notation is made that there were no——

The Court: Where is Exhibit 101? It is the letter, I guess.

The Witness: On the memorandum accompanying the letter, Exhibit 101, it states, "Nothing is known of the amount of pumping by riparian owners but it was probably at a minimum." [2293]

That was noted in the letter, and a note at the bottom of the tabulation for the fourth column indicates that condition, and it was assumed that there were no diversions that day, so that the column——

The Court: Excuse me a minute. I am looking for 101.

Mr. McPherson: I do not have it, your Honor.

The Court: Oh, here it is.

(Testimony of Charles H. Lee.)

The Witness: So that the column headed "Discharge Less Pump Diversions" is the same as the column headed "Discharge" in this tabulation on Exhibit 103.

The Court: That is the Bureau's?

The Witness: Yes. I interpreted it to be that the——

The Court: Oh, that is because, as they state in their memorandum of February 6, they did not take into consideration diversions?

The Witness: Yes, but they assumed it was at a minimum.

The Court: Very well.

The Witness: And for the purpose of analysis of the computation, have assumed it was zero.

The Court: All right.

The Witness: Now, the gain and loss I have estimated for each of the different sections of the river, broken the river up into sections, using the points at which measurements were made.

The first section is from Friant to Lane's Bridge, and [2294] in that section the measurements at Lane's Bridge were 9 second-feet greater than they were at Friant.

The Court: By the Bureau?

The Witness: By the Bureau.

The Court: In February, 1950?

The Witness: Yes.

The Court: February 1st?

The Witness: That is correct. I interpreted that to mean there was a gain of 9 second feet in that

(Testimony of Charles H. Lee.)

section, and therefore the next column loss was zero.

Now, taking the next section below that, Lane's Bridge to Herndon, similarly there was there a discharge of 75.1 second-feet at Lane's Bridge and 86.1 at Herndon, giving a difference of 11 feet, which I assume to be gain, and no loss.

In the next section, from Herndon to Skaggs Bridge, there was a gain of 6 second-feet; but from Skaggs Bridge to Whitehouse, there was a loss of 25.1 second-feet, which appears in the loss column, and zero in the gain column.

I then totaled the gains and the losses, and I found that, taking them section by section, there was a total gain of 26 second-feet, and a loss of 25.1 second-feet on that day of February 1st; and, similarly on the day of February 3rd, the gain was 24 second-feet and the loss 22.2 second-feet.

I then made a similar analysis for the measurements made [2295] by the State October 4th and 5th, 1951, on the second page of Exhibit 103, and there the measurements were made and reported of the pump diversions which were in progress at that time. So that in getting the column heading "Discharge Less Pump Diversions," I subtracted the "Pump Diversions" from the measurement at the station above noted, to get the quantity of discharge——

The Court: At that point?

The Witness: ——at that lower point, without that diversion.

(Testimony of Charles H. Lee.)

In the first section, from Friant Dam to Sample Ranch, the measurement at Friant was 194 second-feet, diversion 4.8, getting a remainder of 189.2 second-feet net.

Then, in the next section, Sample Ranch measurement, 190, and there has been 9.9 pump diversion above that station, so that by subtracting 180.1 was the net flow at Sample Ranch.

The Court: Or a net gain of——

The Witness: A net gain of——

The Court: ——in approximately five miles, of 8/10th. Well, it is 9/10th of a mile from Friant to Sample Ranch.

The Witness: Yes. The flow, as measured at Sample Ranch, was 190, and the flow measurement made at Friant, 189, so that made 8/10ths gain in that section.

Then in the section from Sample Ranch to Lane's Bridge, [2296] similarly there was a gain of 23.9 second-feet; and Lane's Bridge to Riverview,——

The Court: Just a minute. Go ahead.

The Witness: The next section, from Lane's Bridge to Riverview, a gain of 19.5 second-feet. But from Riverview to Herndon, there was a loss of 13; Herndon to Bowser, a loss of 6.1; Bowser to Skaggs Bridge, 10.8; Skaggs Bridge to Gravelly Ford, 16; Gravelly Ford to Whitehouse, 32.2.

The Court: So there was a loss all the way from Riverview?

The Witness: There was a loss all the way from Riverview.

(Testimony of Charles H. Lee.)

The Court: Down to Whitehouse?

The Witness: Down to Whitehouse. And the total of those losses, 78 second-feet, whereas the total of the gains above Riverview was 44.2 second-feet.

Mr. Green: Didn't the loss start somewhere between Riverview and Herndon? Because there was a gain at Riverview, was there not, of 19½ second feet?

The Court: Well, I meant below, that the loss started below Riverview.

The Witness: Yes, the loss started at some point below Riverview.

Now, in comparing the gains of the two sets of measurements, the one February 1st to 3rd, 1950, of 24 second-feet, [2297] and the October 4th and 5th, 1951, of 44.2 second-feet, it appears that the gain in the February set of measurements, when water had been out of the ditches for many months, was much smaller than that in the October set, when the water had been in the ditches during the preceding months.

I assumed those represented the extremes of the year, and that the average of those two values would represent an average for the year 1950 to 1951. That average was 34 second-feet, as compared with the 47½ second-feet for the period December 1, 1936, to 1937.

Mr. Rowe: An average of what, Mr. Lee?

The Witness: An average gain. An average gain in the year 1950-1951 of 34 second-feet, as com-

(Testimony of Charles H. Lee.)

pared to the average gain in the year 1936-37 of 47½ second-feet.

Q. (By Mr. Rowe): Well, it is comparing February and October.

The Court: What was this, 34?

The Witness: 34 second-feet.

The Court: 34 in 1950?

The Witness: 1950-51, as compared with 47½ in 1936-37.

The Court: The way you got that average for 1950 was to add all of these together, these totals?

The Witness: No, your Honor. I considered only the gains. The gain of 24 in 1950, early 1950, then the gain of [2298] 42 in '51. I added those two together, and divided by two to get an average of that period; and the reason for doing that was that the smaller of those measurements, being in February, would represent conditions when the return water was a minimum, whereas the larger of the two represented it when it would be at the maximum.

The Court: Well, which figure did you add, 26 for February 1st, or 24 for February 3rd?

The Witness: Well, I used 25, the average of the two.

The Court: 25, and added that to 44.2?

The Witness: Yes.

The Court: What was the net gain, though?

The Witness: That could be obtained as a matter of arithmetic. At the present moment I wasn't interested in it as much as what the total gain

(Testimony of Charles H. Lee.)

was, for the reason I want the total gain to compare with the total gain of 1936, to see whether the gain was increasing, decreasing, or staying the same.

From the result of this analysis, I concluded that the gain was decreasing, for the reason that in 1936-37 it was 47½ second feet, whereas the average over the period 1950-51 was only 34 second-feet.

Q. (By Mr. Rowe): How about the comparison of the losses?

A. Well, that could be made. What I was studying at [2299] the moment was whether the gain from the Fresno Irrigation District was increasing, decreasing, or remaining the same; and it appears from the data submitted that it is decreasing.

Mr. McPherson: But these gains in the streams that are involved in the charts upon which you took the average are not restricted to gains from Fresno Irrigation District, are they?

The Witness: Or any other source of gain.

Mr. McPherson: Well, then, they couldn't produce a result such as you just gave for the record, could they?

The Court: The February 6th letter states there was no water in Dry Creek.

Mr. McPherson: No, your Honor, you are missing the point. The witness stated he made this calculation to establish this average, in order to determine whether or not there was a gain of the inflow from the Fresno Irrigation District, a gain,

(Testimony of Charles H. Lee.)

loss, or whether it remained constant, in this comparison of 1936 to 1950.

In establishing that figure, he used the stream flow, which is not restricted in its gaining factor to inflow from Fresno Irrigation District. It is a conglomeration of gain from all sources, so it couldn't produce the result he ascribed to it.

The Court: What other source could there be gain from [2300] besides Fresno Irrigation District?

The Witness: There is no irrigation on the north side of the river from outside gravity sources. There is no other source of return water on the south side of the river except the Fresno system. Dry Creek, it is stated in the letter of transmittal of the Bureau data, was dry, no flow, "not running," on that day.

Then in the October measurements, in 1951, the Dry Creek was not flowing, according to Exhibit 80-A.

The Court: That is according to the data upon which you made Exhibit 80-A?

The Witness: That is true, yes. It is a government record, the United States Geological Survey of the flow in Dry Creek, and it indicates there is no flow on that date.

The Court: Well, these charts show a net loss, then, do they not, as a matter of calculation, taking the same method of assumption that you have used in calculating the gain of 34.3 second-feet between Friant and Whitehouse in 1951?

(Testimony of Charles H. Lee.)

The Witness: Well, in addition to the gain of 34.3 second-feet, there is also a loss, and that loss could be similarly obtained by adding 78 and 22.2, which would give 98.2, and which, if it was desired to average in the same way, would give 49.1.

The Court: I did it the other way, 25.1 and 22.2, and [2301] divided it by 2, took that result and added 16 to 78, and divided by 2. In other words, I got an average of the two days in February, and took that average against the two days in October.

The Witness: Yes, your Honor. The reason I did not proceed to the losses was that the losses vary from day to day, by reason of the variation in the flow of the river; whereas the return water from irrigation is a more steady flow. It does not vary from day to day, or instantaneously. It gradually decreases after the ditches are dried up in the fall, and gradually increases in the spring after the water is turned into the ditches.

The Court: Well, I notice both of these would show or tend to show that the gains occur above a point—well, Riverview on one and Lane's Bridge on the other, and Skaggs Bridge on another, and that below that are losses.

The Witness: Yes, your Honor. The chart distinctly shows certain sections of the river gain and certain sections lose, and between the interval of February 1, 1950, and October 1, 1951, there was a movement upstream, apparently, of the point at which seepage began. The movement is higher

(Testimony of Charles H. Lee.)

and higher up the river; the point is moving up the river at which losses——

The Court: To what do you attribute that, in your opinion? [2302]

The Witness: To a lowering of the water level on the Fresno side, in the——

The Court: The ground water level?

The Witness: Ground water level, on the Fresno side, due to the pumping, heavier pumping, in the past few years in the Fresno Irrigation District. That is also evidenced by the behavior of the water table contours in the Fresno Irrigation District area.

Q. (By Mr. Rowe): Mr. Lee, in other words, the reason that you only deal with gains, if I may hazard a guess, is that the gains all occur upstream from Skaggs Bridge, and that would mark about the termination of the Fresno Irrigation District to the west, would it not?

A. Yes. In 1950 the gains were above Skaggs Bridge.

Q. And the reason you took the gains is that those gains were opposite or northerly of the Fresno Irrigation District? Would that be the reason you only took gains?

A. Well, I assumed that the line of testimony of the past two or three hours has been directed to whether or not the gains in return water from the Fresno Irrigation District had been increasing or decreasing.

Q. Yes.

(Testimony of Charles H. Lee.)

A. That is the reason I was trying to adhere to the line of testimony, without divergence on other subjects. [2303]

Q. As shown by the State report, there is a net loss between Friant and Whitehouse of about 33.8 second-feet.

The Court: Well, I don't wish to divert the line of testimony, but there has been considerable testimony about alluvial cones and aquifers, and it keeps recurring to my mind, Mr. Lee, that these losses began somewhere in the very rough vicinity of where you place the Modern Alluvial Cone and where Professor Smith drew his line; so that the query occurs to me as to whether or not the seepage from the river begins there in the vicinity of where you have placed the Modern Alluvial Cone and Professor has placed his—I have forgotten what he named the line, the black line, where it joins the river and went southerly and west.

In other words, is there any relationship between these figures that you have given and your line of the Ancient Alluvial Cone and Professor Smith's line of——

Mr. McPherson: Line indicating the southern boundary of contribution of the river to the south.

The Court: Well, he called it a trough—or a ridge, I believe.

The Witness: Yes, there seems to be——

Mr. McPherson: He called it a divide, your Honor. He didn't call it a trough.

The Court: Divide, all right.

(Testimony of Charles H. Lee.)

The Witness: There seems to be a relation to where the [2304] head of that trough is first on the Madera side in earlier years, and more recently on the Fresno side. And I had made a study of that, and had drawn an exhibit which would illustrate that.

The Court: Well, I am just—you say there is some relation?

The Witness: In my opinion, there is, yes, and I have made a study of it and have prepared an exhibit.

The Court: But you are still of the opinion that the water in the river above the line of the Modern Alluvial Cone, in between there and Friant, percolates southerly as you have heretofore indicated?

The Witness: It is progressively percolating more actively to the south, farther and farther upstream. The heavy pumping in the lower portion of the Fresno Irrigation District has lowered the water table considerably below the river level.

The Court: Within your Ancient Alluvial Cone, or within your Modern Alluvial Cone?

The Witness: It is beginning to encroach upon the Ancient Alluvial Cone.

Mr. Green: Do I understand you, Professor, that the flow of the——

The Court: Mr. Lee.

Mr. Green: Excuse me. Mr. Lee, do I understand you [2305] correctly that the flow of the San Joaquin River to the south is just beginning to

(Testimony of Charles H. Lee.)

encroach underneath the Ancient Alluvial Cone?

Mr. Rowe: We have another exhibit.

The Court: Let's save that for another subject. I just got off onto something.

Mr. Green: I just wanted to know if I understood the testimony.

The Court: I expect you will go into that at length on cross examination of this witness.

Mr. McPherson: You may be assured of that.

Mr. Rowe: We intend to put on some more exhibits.

The Court: I am sorry to interrupt you, but, as I indicated, the location of these points seemed to fall in the same vicinity, and I wanted to find out if that were true.

Are you ready to go to that subject now, or had you finished?

Mr. Rowe: I have another exhibit, and I will start in with that.

May Exhibits 101, 102, and 103 be introduced in evidence?

The Court: 101, 102, and 103 may be introduced in evidence in that order.

(The documents referred to were received in evidence as Plaintiffs' Exhibit Nos. 101, 103, and 103.) [2306]

* * * * *

The Witness: 104 was prepared as to conditions in 1948-50, whereas 106 was prepared from the conditions in 1947. [2358]

* * * * *

(Testimony of Charles H. Lee.)

The Witness: I have mentioned and described the material underneath the river bottoms and the river channel which is colored orange in most of those copies and as captioned "Recent Channel Alluvium."

Now beyond the confines of the bottom lands and out onto the bluffs there is no color, but there is the caption on the left-hand side on some of the sheets and on the right-hand side of others, "Older Less Permeable Alluvium Material with Occasional Permeable Cobble, Gravel or Sand Strata." That caption is made with the understanding, and it is desired to have it understood, that the so-called less permeable alluvium [2404] material has a variable permeability. High up on the river in the vicinity of Friant or Lane's Bridge that older alluvium is less permeable than it is at Herndon, and at Herndon it is less permeable than it is further down below Herndon. But it is less permeable in relation to the recent alluvium, to that of the recent alluvium in the river bottoms. But it has interbedded with it permeable sand beds and permeable sand and gravel beds and permeable sand, gravel and cobble beds, and these occur with varying thicknesses, sometimes many feet in thickness, and they occur in varying relations of sand, gravel and cobbles and are quite permeable. That is, interbedded with the less permeable alluvium material are these quite permeable materials, consisting of the sand, gravel and cobbles.

The Court: The gravel beds that you have indi-

(Testimony of Charles H. Lee.)

cated here are schematic and not mathematically to scale?

The Witness: That is correct. They are schematic to illustrate the point. And those permeable beds are visible above the bottom lands all along the river in the bluffs. They can be dug into and seen in the bluffs all up and down the river clear from several miles above Rank's place on down to Gravelly Ford.

Then the well logs on the bluffs and back of the bluffs also indicate the occurrence of these permeable strata, consisting of sand, gravel and cobbles at intervals below the [2405] level of the bottom lands adjacent and on down to the full depth of the various wells whose logs are available. [2406]

* * * * *

The next line, "Deficiency in Supply," is obtained by subtracting the amount of water available for application to the land from the net irrigation requirement.

The Court: That is the figure 2.01?

The Witness: Yes.

The Court: Acre-foot per acre?

The Witness: It would be 2.01 subtracted from 2.25 which gives 0.24 in the case of the Fresno Irrigation District.

This indicates then a deficiency of supply in that district, and there has been a continued drop of the water level in the district for many years. For instance, from 1923—this is note (b) at the bottom of the table—the average drop in the water

(Testimony of Charles H. Lee.)

table from 1923 to 1951 throughout the district is 22.3 feet, or an average of 0.8 of a foot per year.

Mr. Rowe: What is it within the last five years?

The Witness: The average drop in the water table from 1942 to 1951 was 20 feet, or at the rate of 2.2 feet per year. [2455]

* * * * *

(The record referred to was read by the reporter, as follows:

("Assuming that dam is completed and has a capacity of 1,100,000 acre-feet, do you have an opinion whether it will or will not affect the ground water in the Fresno Irrigation District?")

* * * * *

The Witness: It is my opinion that it will not reverse [2487] the present downward trend of the water levels in the Fresno Irrigation District, and that there may be a slight acceleration of that downward trend.

* * * * *

The Witness: By reason of the operation of that dam. The water which will be regulated at that dam is very largely water to which rights now attach.

* * * * *

At the present time, the crop pattern in the Fresno Irrigation District is based upon water being available as it comes in the stream in the early portion of the irrigation season. But with this monthly regulation, the water to which the

(Testimony of Charles H. Lee.)

ditches are entitled under the schedule may be, a portion of it, held over so that it will be available later in the season, and other crops which require later irrigation may be planted and cultivated, which it is not possible to do so under the normal regimenting of the stream.

The use of water as is done now in the earlier portion of the irrigation season is at a time of lesser evaporation and transpiration than would occur if the water was used later [2488] in the season when the temperature is warmer, in July and August, September, when the losses by evaporation and transpiration would be greater; so that by this modified availability of water through the use of the reservior, the over-all consumptive use in the course of a year would tend to increase, rather than decrease, so that the total year's consumptive use would be greater, and therefore the deficiency greater, and the tendency for the water table to drop more rapidly than before. [2489]

* * * * *

The Witness: It is my opinion that the availability of storage capacity in Pine Flat Reservior as proposed will not reverse the present trend downward of the elevation of the water table in the district, and it may accelerate it. [2491]

* * * * *

Mr. Rowe: I have 13 assistants, and I had an extra expert during the noon hour, and one-half hour is not quite sufficient. I will go back to that.

(Testimony of Charles H. Lee.)

Q. (By Mr. Rowe): Mr. Lee, you did prepare a plan of physical solution, did you not?

A. Yes.

Q. And do you want to describe your plan, or will you describe your plan of physical solution?

And may I ask that the memorandum be introduced in evidence at this time as part of the original exhibit, as A of the original.

Mr. Child: Is that the same plan as is called the plaintiffs' plan?

Mr. Rowe: Yes.

The Court: This is the addenda to the plan, is that what you mean?

Mr. Rowe: Yes.

Mr. Abercrombie: I would like to submit, you refer to it as "your" plan. Is Mr. Lee the author of the plaintiffs' plan?

Q. (By Mr. Rowe): Are you, Mr. Lee?

A. Well, the author—I might be, if you might use the word "author." Of course, the author usually refers to something written. [2500]

As far as the written report which was filed under the title "Plan for Physical Solution as Proposed by the Plaintiffs." that may have had other joint authors.

Mr. McPherson: Did it?

Mr. Abercrombie: Did it or did it not?

The Witness: I don't know exactly what you mean by "author."

Mr. McPherson: Did anyone help you prepare that document which was offered in evidence as

(Testimony of Charles H. Lee.)

the plaintiffs' plan of physical solution, Exhibit 89?

The Court: Well, it says on all these documents, "Prepared by Charles H. Lee."

Mr. Green: It is not signed by him.

Mr. Goldberg: It is not signed by Charles H. Lee, your Honor.

The Court: It is signed by Mr. Rank, the plaintiff.

Well, is this your plan of physical solution?

The Witness: Yes, your Honor.

Mr. Green: Did you prepare it?

The Witness: Well, as an engineer, I made certain——

The Court: What do you mean, dictate it? He says it is his plan.

Mr. McPherson: On voir dire, can we ask him what if anything he did in connection with its preparation? [2501]

The Court: You can do that on cross examination.

Mr. McPherson: Very good, sir.

Q. (By Mr. Rowe): Was this plan prepared under your direction and supervision, Mr. Lee?

A. Yes, sir.

Q. You did have assistance, and you did have it checked by other competent engineers?

A. Yes.

Mr. McPherson: We object, unless the engineers are shown and their competency established.

Q. (By Mr. Rowe): Well, were you aided—— He said he prepared it. I will leave it with that.

(Testimony of Charles H. Lee.)

The Court: It was prepared under his direction and supervision, he said.

Mr. Rowe: Yes.

Mr. McPherson: Is the supplement going to be marked 89-A?

The Court: Is this original plan marked 89 in evidence?

Mr. McPherson: Yes, your Honor.

The Court: All right, the supplement will be marked 89-A.

(The document referred to was received in evidence and marked Plaintiffs' Exhibit No. 89-A.) [2502]

Q. (By Mr. Rowe): Mr. Lee, would you please explain your plan, with the supplement to your plan?

A. The plan for physical solution, as proposed by plaintiffs, dated December 15, 1951,—which I understand is marked as Exhibit No. 89 of the plaintiffs—is an engineering proposal, or rather an engineering scheme or method for reproducing to a degree the conditions naturally existing on the San Joaquin River, first, with reference to pump diversion where pumps are located upon the bank of the river and used for raising water from the river and delivering it to adjacent lands for irrigation; second, as to percolation from the river channel, which percolating water ultimately becomes a supply of wells used in irrigation, for domestic purposes, such wells being located either in the bottoms of the San Joaquin River or maybe

(Testimony of Charles H. Lee.)

on the bluffs, the cone, the alluvial cone of the San Joaquin River.

The plan was prepared pursuant to paragraph 12 of the court's order modifying the temporary restraining order, dated August 29, 1951, and it presents a physical solution designed to supply water for irrigation and domestic purposes to three classes of land indicated by the court, namely, the lands heretofore supplied by pumping directly from the San Joaquin River, between Friant Dam and Gravelly Ford; secondly, lands heretofore supplied by pumping from wells in [2503] the San Joaquin River bottoms; third, lands neighboring the river in Madera and Fresno Counties.

The lands neighboring the river I have interpreted as being those lands within the cone of the San Joaquin River which received percolation by seepage from the river, as the river is in its natural state.

The river in its natural state has a wide variation of flow, and during the melting-snow period there are high stages, and during such stages a much more active percolation occurs from the river to the surrounding lands, both in the bottoms and beyond the bluffs, and also the stage of the water is higher so that pumping directly from the river does not involve as great a pumping lift as in a little bit lower stage.

Much of the water percolating from the river occurs at high stages, but, for the purpose of this plan, in order that some method might be worked

(Testimony of Charles H. Lee.)

out for a maximum salvage or conservation of the waters of the San Joaquin River, it was assumed that the average, or what might be termed the average condition of flow stage would be reproduced, namely, the average flow of the river. Such a stage does not represent a condition as favorable for percolation as at the higher stages, but, if made permanent, that is, through the year so that the stage was at the average throughout the year, there would be to a degree a compensation in that the water stage [2504] would be higher during periods when under ordinary circumstances the river might be lower in its flow than average.

The average flow of the San Joaquin River is in the neighborhood of—I am looking through my notes for the exact figure—2456 acre-feet in the——

The Court: Acre-feet?

The Witness: Second-feet, in the average year selected in Exhibit 106. That was the year 1934-35.

The Court: That was the year that you selected in one of your other exhibits as an average year, because it was 103 per cent above the 60-year average?

The Witness: Yes, your Honor. It was 3 per cent above.

The Court: 3 per cent, yes.

The Witness: The 60-year average, that is Exhibit 106.

Now, for such an average stage of the river, the depth, the average depth of water up and down the river is approximately five feet, as indicated

(Testimony of Charles H. Lee.)

on Exhibit 70. On that exhibit, under the column "2,000 second-feet," it appears that the average depth of water is 4.4 feet at the different gauging stations, that is, of the six gauging stations, and that at 4,000 second-feet it is 6.2. And by proportion, for a discharge of 2500 second-feet, the depth would be about 5 feet.

The profile of the river was then examined, and studies [2505] were made on that profile, and points selected and examined on the ground at which check dams might be constructed for the purpose of maintaining an average depth of water up and down the river, of the depth of 5 feet, which is equivalent to the average flow of the river.

The Court: The 2300 second-feet in the 1934-35 would have an average depth of 5 feet in the river?

The Witness: Approximately. 2456.

The Court: Whatever it is, 2456.

The Witness: Yes.

Twelve sites were originally selected for the location of check dams, and in the addendum here as Exhibit 89-A, two additional sites were added, making 14 in all.

The average depth of water at the site of the dam at these various sites is greater than 5 feet, but at the upper end of the pond created by these dams the depth would be very small, less than a foot. But on the average, the average depth, taking into consideration both the depth at the upper end of the pond and in the dams, and the height

(Testimony of Charles H. Lee.)

of the water over the top of the dam, the average depth at these 14 selected sites is about 5 feet.

So that it was felt—it was my conclusion that to the degree of the percolation resulting from the average flow of the stream these dams, by maintaining a depth along the channel equivalent to that for the average flow of the streams, [2506] would at least reproduce conditions of seepage and percolation equivalent to that of the upper flow, although they would not provide those large slugs of water which the peak flows of the stream or the summer flow of the stream, in its normal regiment, provide. [2507]

Now in order to operate these dams to permit of flows larger than that necessary——

The Court: Just a moment. This contemplates what release from Friant?

Mr. Rowe: 400 second-feet, your Honor.

Mr. McPherson: Let the witness answer, counsel.

The Witness: The release from Friant——

The Court: The amount recommended will be 400 second-feet as an average and 500 second-feet as the maximum. That is on page 3.

The Witness: Yes.

The Court: Very well.

The Witness: That is the estimated amount which will be required, and that would be a flow with the gates in raised position.

The Court: That is, closed?

The Witness: Yes.

I might state that the dams were designed for

(Testimony of Charles H. Lee.)

the full width of the stream at each location and the deck of the dam in each case flush with the stream bed, the average stream bed.

The Court: What is the deck of the dam?

The Witness: I use the word "deck" to refer to the lip or the bottom.

The Court: The bottom of the dam? [2508]

The Witness: Well, in a way it may be termed a bottom. When the gates are raised the gates themselves form the obstruction, but when the gates are down there is no obstruction but the base upon which the gates are placed I have spoken of as the deck, and that is a concrete slab which would be some 18 to 24 feet in width up and downstream and extend from one side of the stream to the other, and the gates would be placed upon and operated from that deck which is flush with the bottom or the bed of the stream.

The Court: Now that deck would have built on it these cobblestone dams, is that it?

The Witness: No, your Honor. There would be gates, wooden gates, erected upon that deck.

The Court: All the way across?

The Witness: All the way across. The deck would be founded upon three types of foundation, the upper five dams, the first five in the upper portion of the stream where cobblestones are very prevalent, the deck at those sites, my plan provides for wooden cribs which will be constructed in excavations made across the stream, excavations below the stream bed. Those cribs after construction are to be filled with cobbles and gravel to

(Testimony of Charles H. Lee.)

hold them in position and the deck then in concrete to be constructed upon the top of those cribs extending from the upper face of the crib upstream to the downstream face. But that deck, as I say, [2509] would be just flush with the stream bed so that the concrete of the deck and these cribs would all be below the stream bed.

The cribs would be supported by the gravels and cobbles of the material beneath the stream bed at the bottom of this excavation to be made and then after construction would be backfilled so that the bed of the stream would then be brought back to a level flush with its original bed.

And downstream from the cribs the plan provides for heavy rock which will not be easily moved by the stream when in the large flow. That apron of rock extends in depth from the deck down from four feet and extends downstream a sufficient distance to protect the structure from undermining on the lower side by the flow of the water.

Now at sites further down the stream the information available indicates that a hardpan or more frequently a clay is available for landing piles which would support the deck, and at sites No. 7, 8, 9, 10 and 11 a type of foundation was provided whereby at the upper end of the deck sheet piling would be driven clear across the stream to provide a cut-off or obstruction for water getting under the deck and also supporting the upper edge of the deck and the downstream edge of the deck would be supported by round wooden piles

(Testimony of Charles H. Lee.)

at 4-foot intervals, both the sheet piling and ground piles to be driven to the supporting clay.

Mr. Child: Are you referring there to type 3?

The Witness: That is type 3; yes. [2509a]

In each site before construction the sites would be prospected by borings to determine whether that type could be used or not.

Now a third type——

The Court: Which is type 3?

The Witness: Type 3 is the last sheet, your Honor, in the original report. That is the one that shows on the right-hand upper portion of the drawing the sheet piling on the upper edge of the deck and round piling on the lower.

Mr. Green: Mr. Lee, have you made those borings or any borings in that vicinity?

The Witness: Some have been made and there have been a visit made to various gravel pits all up and down the river and information obtained from operators of those gravel pits and information of that character indicates that in certain sections of the river that this clay is encountered to a depth that would be satisfactory for landing sheet piling and the round piles.

Mr. Abercrombie: What section is that, the one where you have dams 7, 8, 9, 10 and 11?

The Witness: Yes.

Now for a location where the clay or hardpan is not within reasonable distance, a type 2 has been designed. That is on the next to the last sheet. And on the right-hand upper [2510] corner of

(Testimony of Charles H. Lee.)

that sheet appears the deck supported by the sheet piling both on the upper edge and the lower edge.

Mr. Child: Mr. Lee, upstream is to the left of the map?

The Witness: Yes, in that section on the right-hand upper corner of the sheet, upstream is to the left and downstream is to the right.

Mr. Child: As to both maps?

The Witness: Yes, both the type 3 and type 2 and also type 1.

Mr. Child: That is also true on the illustration on the left-hand side?

The Witness: Some of the illustrations on the left side of the drawing are elevations. The ones to which I have referred are on the right-hand side of the drawing and those are sections.

Now in the type 2 foundation plan this type would be used where there are no cobbles or gravel and where there is no clay within a reasonable distance and the piles can be driven and are designed to have a depth of penetration such that the stability of the dam would be assured, and regards the possibility of percolating water passing under the dam and so undermining it. The length of the piling would be such as to prevent that.

These three types of foundation represent the three [2511] types of conditions for foundations along the river, and although in the plan as set out type 2, from the information available, would be particularly adapted to sites 6 and 12 and also sites 13 and 14 in the addendum, yet it is pos-

(Testimony of Charles H. Lee.)

sible that detailed borings on the individual sites might make it desirable to use a type 2 foundation at some of these sites numbered 7, 8, 9, 10 and 11.

Now with regard to the superstructure, each of the three sheets showing the typical collapsible check dams indicate the wooden gates superimposed upon the deck. These gates in times of large flow would lie flat upon the deck and a recess is provided upon the deck so that when the gate is down the level of the top of the gate is at the same elevation as the level of the concrete in the upper side of the deck. That is when the gate lies flat. The water then would flow over the deck without obstruction and then pass on to the rip-rap section below the dam.

Mr. Child: Both gates?

The Witness: Well, there are more than two gates in each dam.

Mr. Child: On No. 3 aren't those two gates?

The Witness: No, I think possibly you are looking at the prop run.

Mr. Childs: I don't know. It has detail of gates (plural) and I was wondering if the short one is a gate. [2512]

The Court: No, the one, the detail. This is not complete. It is on sheet type 1. It shows the gate on the left, with its elbow or prop underneath. That is what he is describing.

Mr. Child: Oh, I see. One is cut off.

The Court: One is the gate, and the other the prop.

(Testimony of Charles H. Lee.)

The Witness: In the drawing it was not continued through, only on type 1.

The Court: Of course these dams would not be water-tight, would they?

The Witness: No, your Honor. There would, however, be a rubber strip by the gates, to reduce the——

The Court: Seepage?

The Witness: ——well, to a minimum, between the gates. There would always be an overflow, however, so it would be immaterial if there was a little leakage. It would not affect the operation of the dam.

The Court: In other words, the 400 second-feet would fill these, then would continue to flow 400 second-feet?

The Witness: Yes, except what was lost from that pond by pumping and by seepage.

The Court: And transpiration and evaporation?

The Witness: Yes.

Mr. Rowe: It is just an odd thing, but the same type of dam appears in State Report 29, as Mr. Lee designed. They [2513] look very similar, although Mr. Lee said he never saw it.

The Court: All right.

Whose motion?

Mr. Abercrombie: I just asked what time it was. I thought that would be more interesting.

The Court: All right, we will take a recess.

(Recess.)

Mr. Rowe: I took the liberty of laying the plate

(Testimony of Charles H. Lee.)

with the 58 Roman numerals on report 29, on the court's desk. It just shows the coincidence in the collapsible dam that is referred to, your Honor.

The Court: The collapsible dam?

Mr. Rowe: Just a coincidence, that in the original State plan they were going to pump the water up the San Joaquin River by stages, and they used the collapsible dams, across the stream, the dam I pointed out.

Mr. Abercrombie: It is slightly different, pumping water upstream, than having it come down them.

The Court: Counsel's point is a collapsible dam was at one time thought practical by the State.

Mr. Rowe: On the San Joaquin.

Mr. Abercrombie: Under other circumstances.

The Court: Let's get on. Report 29 is in evidence.

Q. (By Mr. Rowe): Mr. Lee, will you proceed with your explanation of your plan?

A. I think I was commenting on the gate feature.

When in operation, the gates would be in raised position, as shown on the type 1 drawing. The wooden gate in each case being propped up with two braces at the downstream side, to hold it in position, so as to raise the level of the water to a level above the stream bed. These gates are hinged, as indicated in the drawings, and the prop is also hinged.

In the raising and lowering of these gates, as

(Testimony of Charles H. Lee.)

indicated in the addendum, there would be a trackway on either side of the deck at the upper edge and lower edge of the deck, and a gantry crane or straddle truck provided, a picture of which appears in the addendum.

The Court: Is this a picture of one in use some place?

The Witness: Yes, your Honor. That has been in use many years.

The Court: Whereabouts?

The Witness: Feather River, at the intake of the Soda Butte Canal.

The Court: Do they have the same kind of dam there?

The Witness: Same dam, yes.

The Court: I mean——

The Witness: Collapsible gates.

The Court: Collapsible wooden gates? [2515]

The Witness: Yes, the dam has been there many years in operation, with a flooding power greater than ever occurs on the San Joaquin.

Q. (By Mr. Rowe): What are the floods on the Feather River?

A. 175,000 or more cubic feet per second. On the San Joaquin I think the maximum was about 71,000.

Q. And who owns this guillotine, as it has been referred to by opposing counsel, and operates that?

A. I don't know if it is operated by the canal company or the power company. I think it is operated jointly by the Soda Butte Canal Company

(Testimony of Charles H. Lee.)

and the gas and electric company; which operates it I don't know, but it is provided, I think, as a joint concern there.

The Court: Where is this dam?

The Witness: It is on the Feather River near—below Oroville.

The Court: How far is that from here?

The Witness: About, I should say, 250 miles, 200 miles.

Mr. Rowe: Do you want Mr. Boyd and I to go along?

Mr. Child: Why exclude me? I would like to take the trip, too.

The Witness: It is a river that drains the Sierra Nevada Mountains, just as the San Joaquin does.

The Court: I don't know, maybe I would [2516] like to see it.

The Witness: In the operation of this gate, the gantry crane ordinarily would be stored on one of the abutments, as most easily accessible.

The Court: You would want a gantry crane for each dam?

The Witness: For each dam; and it would be stored ordinarily on the abutment, on the floor level, practically extending from the back up an incline and to the level of the top of the abutment.

The Court: Is there a dam up there of the same type, concrete foundation, as this, with the rails on it?

The Witness: Yes. I think it is possible that deck may be timber instead of concrete. There are

(Testimony of Charles H. Lee.)

advantages in timber, in that timber is more flexible than concrete, and that — I am not certain whether that deck in that dam is timber or concrete. Either would serve, but there are some advantages to timber. But that has been in operation, a dam of similar character, for some 25 years. [2517]

Mr. Rowe: I will have the man who constructed it and operated it under his supervision for 20 years in tomorrow, I hope.

The Witness: The straddle truck in operation would be lowered from the abutment down the incline to the level of the deck and across the structure clear to the far side.

The Court: The what?

The Witness: The gantry crane or straddle truck would be lowered from the abutment where it is ordinarily stored down the incline.

The Court: By caterpillar?

The Witness: Either by caterpillar or block and tackle or some method of lowering it.

The Court: How wide do you propose to make these sections of the gates?

The Witness: Each gate is six foot in width, that is, from side to side of the gate, then the rubber strip overlapping the gap between it and the next gate. And those gates are raised and lowered individually. If the operation is to lower the gates the crane would be propelled across the dam to the far side and then a gas motor is provided for on the upper level of the crane with a hook

(Testimony of Charles H. Lee.)

and chain which can be engaged with an eye on the gate and raise the gate an inch or so so that the drop would drop. Then the gate can be lowered into its position flat on the deck. [2518]

The Court: How do you get that elbow up?

The Witness: If the operation is to raise the gates then one of the men can step off the platform of the crane and raise that prop after the gate is raised.

The Court: Wouldn't he get pretty wet? Wouldn't he be liable to be washed downstream? I mean, when you raise the gate the water will swirl around behind, will it not?

The Witness: A flow of 400 second-feet would only mean a few inches depth of water over the deck and the water is not flowing with any great velocity at a stage of 400 second-feet.

The Court: These gates would contemplate to be raised when the river was 400 second-feet? In other words, under the stream flow chart as introduced here and proposed for this current year and the coming year—I have forgotten the exhibit number—but I recall that there were very large stream flows during some months. In those months the gates would be down, is that it?

The Witness: If the flow exceeded 500 second-feet. In the addendum I have provided for——

The Court: Do you have that exhibit number?

Mr. McPherson: No.

Mr. Rowe: Have you the proposed flow, sched-

(Testimony of Charles H. Lee.)

ule, Mr. Lee, for this year handy for the judge to take a look at?

The Court: I think it was one of the early exhibits, I think put in by Mr. Boke.

Mr. Rowe: Mr. Blote came down and gave it. It is a one-sheet exhibit, Mr. Lee.

Mr. Child: I am at a loss, Mr. Lee. How do you close those gates when you get down to one gate left, with all that water going through that last gate? Would this crane do it?

The Witness: I did not hear your question.

Mr. Child: How do you close the last gate off with all this water going through? Would that one crane close it?

Mr. McPherson: That is Exhibit 81, your Honor.

The Witness: Yes.

Mr. Rowe: I am going to put the man on tomorrow that runs it.

Mr. Child: What about the last one, when you get over to the last one, you have the full flow going through that last one?

Mr. Green: Six feet.

Mr. Child: Six feet.

The Witness: Yes.

Mr. Child: Would the crane raise it?

The Witness: Yes.

Mr. Child: Without shutting down the river?

The Witness: Yes. It is a power-operated machine.

Mr. Child: What happens to the man?

(Testimony of Charles H. Lee.)

Mr. Abercrombie: Who puts the chain in the eye, in other words? [2520]

The Witness: He may get a little wet.

Mr. Child: He may get a little wet, but that is all?

The Witness: Yes.

Mr. Rowe: We will have the man who runs them here tomorrow, and will their faces be red.

Mr. Child: I want to know what happens to them.

Mr. Rowe: I will guarantee counsel that I will put a good man on.

The Court: Let me see, this flow schedule here is in terms of acre-feet and not in terms of second-feet. How do you translate that?

Mr. McPherson: The formula is on the bottom, I believe.

Mr. Rowe: You divide it by 60.

The Court: Which one of these columns here shows that information? I do not see it. You get it by taking the difference between the storage at the beginning of the month and the end of the month?

Mr. McPherson: The river flows are shown there.

The Court: You multiply by 60, you say?

Mr. McPherson: There is a formula that these gentlemen use. If you show it to Mr. Lee I am certain he can tell you how to convert it.

The Court: In other words, for instance here in July they propose, according to this, 172,910 acre-feet. [2521]

(Testimony of Charles H. Lee.)

Mr. McPherson: Divide that by 60.

The Court: Divide that by 60?

The Witness: By 62 in July.

The Court: Why 62?

The Witness: There is 31 days.

Mr. Green: Mr. Lee has a slide rule.

Mr. Rowe: About 2500 second-feet.

The Court: It is about 2700 second-feet. Well, in those months when that large flow is there you would have the gates down?

The Witness: Yes.

I might read paragraph 12 in the addendum, the last page of the addendum. I have there stated:

"Collapsible gates shall be maintained in raised position throughout the year, except when (1) flood control releases from Friant Dam are contemplated, (2) releases are to be made for the purpose of scouring the channel and removing accumulated silt and organic seal from the bed and banks of ponds created by check dams, and (3) when releases for any other purposes are to be made in excess of 750 second-feet."

The Court: The third then would be applicable as to all of them, would it not? In other words, whenever there is a release in excess of 750 second-feet the gates are down? [2522]

The Witness: Yes, except where flood control is contemplated from forecasts, they would be down even though the flow had not reached that amount.

The Court: I see. Go ahead.

The Witness: I had described the method of

(Testimony of Charles H. Lee.)

raising and lowering the gates by use of the gantry crane and after the operation is completed, which would take about six hours with two men, the crane would then be brought back to its original station.

The Court: Now is it contemplated by this plan that these gates go from bank to bank as they now exist or that you would build earthen or earth filled or some kind of a dam out a short ways from the river?

The Witness: No, your Honor, they would go from bank to bank.

The Court: Present bank to present bank?

The Witness: Present bank to present bank. There would be an abutment at each bank that would run back into the bank but not project into the river.

The Court: Why is it necessary to have them all the way across the river? Why could not the same function be performed by having a permanent dam part way and these gates—the river in some cases is 400 or 500 feet wide, is it not?

The Witness: Yes. For the releases, the flood releases, contemplated up to 8000 second-feet or more, and the dams are [2523] designed so that in time of flood they would not be an obstruction in the channel.

The contemplated use of Friant Dam as a flood control visualizes every few years a discharge up to 8000 cubic feet per second and if the flow at that stage coming into the reservior exceeds that,

(Testimony of Charles H. Lee.)

then the release might exceed 8000 cubic feet per second. [2524]

The Court: And permanent dams with collapsible gates in that portion would act as an obstruction and would be likely to wash out,——

The Witness: Yes——

The Court: ——unless they were very expensively built, I suppose.

The Witness: Yes; and also there would be the raising of the level above and the flooding of the land.

The Court: I see.

The Witness: A dam built, say, to obstruct half the stream channel would back the water up, in case of a flood,——

The Court: And flood adjacent land?

The Witness: ——and flood adjacent land. That is why the dams have been designed to utilize the full channel as it is in the state of nature.

The Court: Well, I notice the profile map of the bottom of the river seems to be very irregular, according to all of the maps of it which are in the various plans. Is that because the river winds on the surface and makes those lateral undulations, or is that because the bottom of the river is pitted with scouring out of pools and ponds?

The Witness: I think the latter condition is the situation, that scouring out you speak of being where there are not cobbles, but the high points being cobble bars or reefs.

The Court: The building of these check dams

(Testimony of Charles H. Lee.)

would have a [2525] tendency to fill up those places, wouldn't it?

The Witness: It might, yes. The release of water for the time of floor, or for scouring——

The Court: Would dig them out again?

The Witness: Might dig them out again; might erode, and cause any loose material to be eroded.

* * * * *

Q. (By Mr. Rowe): Now how many flushings a year would your plan require between April 1st and September 15th? A. Not more than two.

Q. And what head of water and for how long?

A. In my opinion 4000 second feet for 24 hours each flushing. [2551]

* * * * *

Mr. Rowe: I expect to show that the normal releases would probably take care of one flushing, if that is what you are getting at. [2553]

* * * * *

The Witness: Beginning the 1st of April, the release——

The Court: Let me ask you this question—this is what I am interested in—at any time after the 1st of April and before the 15th of September was there one or more periods of 24 hours when 4000 second-feet was released?

The Witness: There was a period of six days when more than 4000 second-feet was released.

The Court: What were they, what days were they?

The Witness: Those were the 14, 15, 16, 17, 18,

(Testimony of Charles H. Lee.)

19, 20 and 21 of June and also the 22 and 23 of June. That would be nine days.

The Court: And they would have been effective had the dams been built to act as a scouring?

The Witness: Yes. [2554]

* * * * *

Q. (By Mr. Rowe): Now, Mr. Lee, from your studies under the State of California proposed plan of operation, what would happen to the wells in the river bottom between the bluffs, in your opinion? [2555]

A. They would all be affected by lowering of the water level and diminution of supply. Many of them would go dry, and the lowering would be continued from year to year so that there would be a continual lowering of the level in the wells in the river bottom. [2556]

Q. Now, under the Bureau's plan, what would happen to the wells in the river bottoms between the bluffs? A. The same thing.

Q. Now, under the State's plan, what would happen to the percolating water supply beyond the bluffs?

A. I might qualify that first statement, as of ultimate operation. With the conditions as of 1951, that would not occur.

Q. The what?

A. The releases of 1951, that would not occur. But under the ultimate operation, when the releases are in the order of a few hundred second-

(Testimony of Charles H. Lee.)

feet, two or three hundred second-feet, or 400 second-feet, that result would take place.

Q. Now, in your opinion, how many acres in total, including bluffs and beyond the bluffs, would receive a diminished water supply if the State's plan went into operation?

Mr. McPherson: May I have that question read before he answers?

(Question read.)

Mr. McPherson: Wouldn't that be material only if he identified the acres?

Mr. Rowe: I am asking about the total acres.

The Court: He can identify them later.

Mr. McPherson: I object, as incompetent, irrelevant and immaterial. [2557]

The Court: Overruled.

The Witness: Approximately 265,000.

Q. (By Mr. Rowe): And, in your opinion, would there be any part of that acreage whose water supply would be eventually destroyed, and, if so, how many acres?

Mr. McPherson: Same objection.

The Court: Overruled.

Q. (By Mr. Rowe) (Continued): That is, under the State plan.

A. Yes, there would be a portion of that, about 178,000.

Q. Acres? A. Acres. [2558]

* * * * *

Q. How many acres would receive a diminished water supply if the Bureau's plan were placed in

(Testimony of Charles H. Lee.)

operation, and how many acres would eventually abandon pumping if the Bureau's plan were put into operation?

Mr. McPherson: We object, if the court please, a compound question, and the land not identified. Not shown that any of them are getting water at the present time from the San Joaquin.

The Court: Overruled.

Mr. Abercrombie: Indefinite and uncertain as to how much it would be diminished.

The Court: If he asked him that, then it would be compound.

The objections are overruled. [2559]

The Witness: The same as for the State plan, in the ultimate development of the use of water from Friant Reservoir and the diversion therefrom.

* * * * *

Q. (By Mr. Rowe): Mr. Lee, how many acre-feet of water, from April 1st to September 15th, do you feel, including scouring allowance, or evaporation during that time, from Friant Reservior, would it take to run your proposed plan?

A. If there were no releases from Friant for other purposes, such as fulfillment of requirements under the [2560] exchange contracts, or other reasons, somewhat a little less than 150,000 acre-feet would be required to operate the proposed check dams during that period, April 1st to September 15th.

Mr. Rowe: At this time I would like to offer

(Testimony of Charles H. Lee.)

into the record the hearings before a subcommittee on public lands, U. S. Senate, Senate document No. 912, May 5 to May 28, and June 2, 1947, and read into the record this statement of Mr. Stoner's, made in the presence of the defendant Boke and Mr. Straus. [2561]

* * * * *

Mr. Rowe: I am quoting from page 708:

"There are certain existing rights downstream from Friant which have to be supplied. Including the riparian rights on the river between Friant Dam and Mendota Pool, water needed for preservation of fish life and waterfowl, and losses from evaporation and seepage in the reservoirs and canals, it has been determined that 150,000 acre-feet of class I water must be reserved to meet those requirements." [2563]

* * * * *

The Court: When it was washed out it would scour up that algae that Professor Smith talked about?

The Witness: It might do more than that, it might erode and create a change in the channel itself which, after repeated washings out every time there is a flood coming down, would tend to destroy agricultural land and to change the whole character of the river channel at that location.

The Court: In other words, the dam can be washed out and washed out repeatedly after it is rebuilt and that does not stabilize the river?

The Witness: No, your Honor. It tends to make

(Testimony of Charles H. Lee.)

the river channel vary. The channel has now in its natural state become stabilized.

The Court: Does not the State plan here have some part of it that is supposed to wash out easy?

Mr. Goldberg: The sides, the wings, wash out easy. There is sheet piling in the center. [2571]

* * * * *

Mr. Rowe: You might ask Mr. Lee, would the State's sacks of concrete stay in position, Mr. Lee?

The Witness: Is this a question?

Mr. Rowe: Yes.

The Witness: No, those sacks of concrete are not heavy enough to remain in position with the floods that will be carried in the San Joaquin River under the operation of Friant Dam in the future, operating it as a flood control. [2572]

* * * * *

Mr. Goldberg: While we are on that subject, I call the court's attention to page 34 of the State's plan, pages 33 and 34 of the State's plan, wherein it is stated: "It is expected that at times high flows due to releases for flood control from Friant Reservoir will overpower these wings and wash them out, eliminating any damages of high water surface elevations causing flood damage to adjacent bottom lands."

The Court: Well, if the wings were washed out, Mr. Lee, and the dam was not washed out, would a scouring of the river occur?

The Witness: Yes, your Honor, not alone in the bottom but in the banks.

(Testimony of Charles H. Lee.)

The Court: If the wings were washed out and the rest of the dam was not?

The Witness: Yes. If the dam remained, that is, if the sheet piling and the sacks remained, or if only the sheet piling remained, it would constitute an obstruction which would throw the force of the current around either end and tend to cut into the banks and to ultimately erode and destroy agricultural lands on either side. [2573]

* * * * *

The Witness: It would be swirling and there would be erosion on either end of where the sheet piling remained in the locality where the abutments had been and the increased velocity on either end between the ends of the sheet piling and the bank of the river would not alone erode the bottom with scouring and swirling but the banks themselves which, under normal conditions, are stable, and would be encroached upon by the higher velocities at the edge of the stream. [2574]

* * * * *

The Witness: Might not be scoured. But in so far as the area on either side and above and below, it would ruin the locality in so far as agricultural land is concerned and for the ultimate safety of the dam when rebuilt again. The continued deep erosion would ultimately result in those pilings being washed out. [2586]

* * * * *

Mr. Green: Now, let's have the answer, assuming that the 4000 second-feet washed the wings

(Testimony of Charles H. Lee.)

of the dam out, how far upstream from the structure that remained, assuming that the permanent structure did remain, would not be scoured by the 4000 second-feet?

The Witness: Well, the bottom of the pond having been filled before the washout took place, before the ends washed out, the bottom having been filled with debris, that debris would have to first be removed before the original bottom, before the high discharge occurred was reached, so that it would depend on the length of time that the flow continued after the wing walls were washed out. It would have quite a body of material to remove first before it would get down to [2588] that level where it had been sealed.

Mr. Green: Assuming a 24-hour flow as you have assumed?

The Witness: Assuming that it flows for 24 hours after the wing walls wash out?

Mr. Green: Yes, that is right.

The Witness: In my opinion it would not clear the coarse debris out by that time. [2589]

* * * * *

Mr. Abercrombie: In other words, your determination of the amount, in your plan, of how much to release at Friant,—you have told us it would be 4 and not to exceed 5 hundred second-feet—is determined by supplying the intervening losses and use between Friant and your last dam, No. 14, and the live flow of 5 or 10 second-feet over the last dam?

(Testimony of Charles H. Lee.)

The Witness: Yes, with a maintenance of a level at each dam such as would duplicate conditions of the very important larger flow.

* * * * *

Mr. Abercrombie: The key to the release, as Mr. McPherson puts it, is your flow over the last dam? [2601]

The Witness: Yes. The whole purpose of the plan was to conserve water and still maintain a supply for direct pump diversion, seepage and percolation which would take place in the natural flow of the stream. [2602]

* * * * *

The Witness: I feel it is a practical plan, one for which the details have been thought out. The construction, I feel, is permanent, and the operation is practical; that although it will not maintain the percolating supply to the degree which the natural flow has done and the flow of the stream in the past many years, because of the fact that there would be no long periods of high discharge, yet by maintaining the level throughout the year I feel there would be some compensation for that loss. I do not feel that it is going to maintain and sustain and contribute to the percolating [2606] supply to the extent that it had been under natural conditions, but it will be a reasonable maintenance of that supply.

The cost I consider as reasonable; the estimated cost of $1,100,000, as indicated in the addendum,

(Testimony of Charles H. Lee.)

I consider as a reasonable cost for the construction cost of those dams.

The total cost, according to the testimony now, is that at Tracy Pumping Plant, plus the Delta Mendota Canal, entailed an expenditure of some $80,000,000, of which——

The Court: 80——

The Witness: $80,000,000, in the testimony—I think it is page 602. [2607]

* * * * *

The Court: Now, if no plan is put into effect, how much water will be necessary to be released from Friant Dam, and at what periods, to maintain the present conditions and demands for direct diversions, underground water demands, as you have described them.

The Witness: Well, nothing but the natural flow would maintain the supply as it has been in the past. [2610]

* * * * *

CLARK BURNETT

Direct Examination

The Witness: These are Report numbers 11 and 12.

The Court: Report No. 12?

The Witness: Report No. 12.

The Court: And what is Report No. 12?

The Witness: This is the lands adjacent to the

(Testimony of Clark Burnett.)

San Joaquin River between Friant and Gravelly Ford, showing the owners and acreage and assessed valuations as of, I think, 1938.

Mr. Boyd: Are you going to offer these, Mr. Rowe?

Mr. Rowe: Yes.

Mr. Boyd: May we have them marked for identification at this time?

Mr. Rowe: All right. I will ask that Report No. 11 hereinbefore referred to be marked for the purposes of identification as 7-51-25; and Report No. 12 as 7-51-26.

Mr. Brett: Your Honor, wasn't the date supposed to be an indication of the particular day we were in trial? Wasn't that what your purpose was?

The Court: No. My purpose was to indicate it was the hearing which began in July 1951 as distinguished from the ones we have had in February 1950 and the other various dates.

Report No. 11 will be marked for identification "7-51-25," and Report No. 12 as "7-51-26."

(The documents referred to were marked Plaintiffs' Exhibits 7-51-25 and 7-51-26 for identification.) [2742]

Mr. Rowe: All right.

The Court: Now, do you have copies of those?

Mr. Rowe: Your Honor, as far as I know there are 10 copies in existence which are very, very hard to bring forth to the public; and I have made a copy of this but it is not in color. I think it is important enough to leave the originals, and

(Testimony of Clark Burnett.)

possibly the State or the Bureau have extra copies, of which I might inquire. I was told by Mr. Edmundson there were only 10 copies in existence.

The Witness: That is the only copy I have in my office and I need it for reference once in a while, and sometimes other people come in and want some information. Mr. Rank was in and various others. It is the only thing I have to refer to. I would like to have them returned.

Mr. Rowe: It is a public document and there ought to be a few available for the public.

The Court: Well, they will be returned ultimately.

The Witness: I would hope.

Mr. Rowe: Would you mark the figures "7-51-24" on it?

The Court: "7-51-24-A," that will be the original.

Mr. Rowe: "7-51-24"?

The Court: "-A."

Mr. Rowe: Yes. On the map which is the——

The Court: That is Report No. 11, is it?

The Witness: Oh, yes. [2743]

Mr. Rowe: No. It is part of Report No. 12.

The Court: Report No. 12, all right. Following and attached, either in the report—or, is the report attached?

The Witness: It is plate 3, this map.

The Court: Plate 3 of that report.

Mr. Rowe: And it is the original map which is 7-51-24—no.

The Court: That is right, "7-51."

(Testimony of Clark Burnett.)

Mr. Rowe: The clerk is now marking them "8-1-51."

The Court: No. They should be marked "7-51," Mr. Clerk.

Mr. Pfaffenberger: Your Honor, I wonder if I could make a statement? My name is Irving Pfaffenberger and I am senior attorney, Division of Water Resources, State Department of Public Works.

The Court: Of the State of California?

Mr. Pfaffenberger: Of the State of California. We would like very much to have those reports returned as soon as possible. We have no copies of them. I inquired at Sacramento and there are no copies, as far as we can find out, that are available and this is an office copy, and the only record we have here in Fresno. We would like very much to have it returned. We wondered if photostats could not be made of the pertinent parts of it and the originals returned to the Division.

The Court: I understand that you have caused to be made typewritten copies and photostated the plates. [2744]

Mr. Rowe: Yes.

The Court: The difficulty with that photostating of the maps is that there are so many keys to the maps that they do not show color. But I will see what can be done about returning the reports as promptly as possible. Perhaps there will be no objection to substitution of the copies which Mr.

(Testimony of Clark Burnett.)

Rowe has had typed and letting these originals go back to the State.

Mr. Pfaffenberger: I understand the U. S. Bureau of Reclamation have copies of these maps, and that might provide a means of substitution later on, your Honor.

The Court: Well, perhaps you can take it up with the Bureau and have them substitute the maps with the copies of the reports. Can that be done, Mr. Boyd?

Mr. Boyd: We can see what we have, your Honor, and if there is anything available, we will produce it gladly.

The Court: All right.

Q. (By Mr. Rowe): Would you state whether a copy which we have marked "7-51-24-A" in Report 12, which is 7-51-26 for the purposes of identification, is the same as or identical, with the exception that the original is in colors?

The Court: Is that one you have in your hand a photostat of the other one?

The Witness: It looks as though it covers the same territory.

The Court: Well, it is the same photostat?

The Witness: The same thing. [2745]

The Court: All right.

The Witness: I think so.

The Court: Mr. Rowe, do you have typewritten copies of Reports 11 and 12?

Mr. Rowe: I have typewritten copies which were prepared in my office and checked by my secre-

(Testimony of Clark Burnett.)

tary, whom I would be glad to put on the stand to identify them. She personally checked their accuracy.

The Court: Do you have copies that you can substitute at this hearing?

Mr. Rowe: I have one extra copy that I could substitute of each volume.

The Court: Well, that being the case, then it would seem to me that if some arrangement can be made to supply the charts in color, that you could leave your copies here and those charts could be substituted for the photostats you have, or let the witness accompany them, and then the originals of these documents might go back to your office, Mr. Pfaffenberger, might go back to your office for such public use as you need to have of them. In the meantime, of course, they can be examined here by anyone.

Mr. Pfaffenberger: The custody of the records physically is in this Fresno office; is that correct, Mr. Burnett?

The Witness: Yes. We keep these in the Fresno office. [2746]

The Court: Let us not take time now to examine copies. Do that during some recess. We will use these for this session this morning.

Mr. Rowe: I was going to offer them in evidence. They are public documents. The court may take judicial notice of them.

The Court: They will be admitted into evidence and substitutions made.

(Testimony of Clark Burnett.)

Mr. Abercrombie: We object, if the court please, that some of these documents or some parts of them are incompetent and irrelevant on this particular hearing.

The Court: I would not be surprised but what they are, counsel, but they appear to me to be rather large documents, and they are public documents and the court can take judicial notice of them, and therefore the court will have recourse to those that are material and competent in those two reports.

Mr. Boyd: Can the purpose for which they are offered be stated for the record, your Honor?

Mr. Rowe: The purpose for which they are offered, your Honor, is to show that these documents were prepared by the State of California and 21 engineers of the United States Bureau of Reclamation as showing what the riparian rights on the San Joaquin River are, or those that they admit, the extent of the percolating waters flowing and originating in the San Joaquin River between Friant Dam and Gravelly Ford [2747] under the lands referred to in the amended complaint filed yesterday in Rank versus Krug, and which also indicate lands to which the riparian rights are doubtful, as additional area.

They also are offered in evidence to show as an admission by the defendants that in their own report they admit that the San Joaquin supplies in toto the underground water supply between Friant Dam and a point 25 miles downstream which

(Testimony of Clark Burnett.)

feeds the underground waters underlying the lands of the plaintiffs in the Rank case; and that from that point to Gravelly Ford the San Joaquin River is the principal source of supply for the percolating waters underlying the lands of the plaintiffs in the Rank case.

Mr. Boyd: If your Honor please, I object on the grounds that they are immaterial and irrelevant. They are at least a dozen years out of date. The purpose of showing what lands are or are not riparian necessarily involves conclusions of law and the authors of the reports.

The Court: While they appear to be some dozen years old, the matter of the determination of water rights takes into consideration a point of time when the right vested. So I do not think that makes any particular difference. I do not think that they would be conclusive against the defendants and I do not know that they would be conclusive upon this point as to what are riparian rights or as to what lands are fed by percolating waters. But they are public documents [2748] and I presume that either the Bureau of Reclamation or the State of California or somebody acted upon them. I think they are admissible for the purposes of this hearing.

One of the difficulties suggested at the last previous hearing here was the ascertainment of lands which depended upon the San Joaquin River for their rights, either as riparian or as percolating waters. This will be of some aid to the court.

(Testimony of Clark Burnett.)

Mr. Abercrombie: If the court please, with particular reference to proposed Exhibit 25, which is Report No. 11 on underground water supply, this is a hearing, as I understand it, entirely a matter of urgency upon a temporary injunction and at the outset of this hearing Mr. Rowe made the statement to the court, as I understood it, under questions by the court, that he was seeking an injunction for the riparian owners between Friant and Gravelly Ford in the case in which my clients are interested, The Rank Land Company case.

If the court please, it may be of some help to know just what our position is. We are in a different position, of course, from the Government.

The Court: Let us see, now. You are for the certain irrigation districts?

Mr. Abercrombie: We are. When I say "we" I think I include all the districts on the Friant-Kern Canal diverting from Friant Dam. [2749]

The Court: That is on the Friant-Kern?

Mr. Abercrombie: South.

The Court: That is south.

Mr. Abercrombie: Yes, your Honor.

The Court: That does not refer to Madera?

Mr. Abercrombie: No, your Honor. Madera appeared separately.

We do not want to be taken, your Honor, and we never have said and we do not now say, that any riparian owner having a right on this river between Friant Dam and Gravelly Ford should be

(Testimony of Clark Burnett.)

denied his water. We have never taken that position. We do not take it now.

We think that all of those riparian owners should have water available in the river for them to use, to the extent reasonably necessary to irrigate their riparian lands, using all reasonable means to divert that water, which, as I understand, is their water right.

We agree with your Honor's position and opinion that Congress did not intend to cut off the water from these riparians in the project. We believe that what I have stated is substantially the definition of what a riparian right is in California since 1928.

But the difficulty upon this hearing and the matter that concerns us most and the reason we are here is this: That the rights of these parties are only to a reasonable quantity [2750] of water for riparian use on their lands, using all reasonable means to get that water. But what we would not like to see happen, your Honor, even though on a temporary restraining order, even for one day, is to allow a full river of water to go by any owner's land so that he may, without stepping out of his door, take his water and allow the excess to flow on into the ocean. We do not want to see that happen.

If that does happen, your Honor, then I think that is contrary to what Congress intended, because Congress intended to conserve water.

To the present writing, I imagine that 750 million,

(Testimony of Clark Burnett.)

probably three quarters of a billion, dollars have been spent on this project, all dependent upon having water at Friant Dam to divert into these huge canals.

The Court: And to preserve the prior rights.

Mr. Abercrombie: And to preserve the prior rights as those rights exist, but not to waste a drop of water.

In other words, it is my understanding from the Bureau and from every one I have talked to for the past 20 years that I have been following this matter and working on it, is that those rights would be taken care of.

Therefore, we would like very much, your Honor, that your Honor zealously guard that water and not let one drop go down that river that is not absolutely necessary. And I say that repeatedly for this reason—— [2751]

The Court: Counsel, as far as that is concerned, I think that a careful reading of a rather laborious opinion which I made indicates that I have an appreciation of the purpose of the Friant Act and the value of water, that none should be wasted at all.

Mr. Abercrombie: There is one other thing, your Honor, that I do not imagine your Honor would be familiar with because it has never been brought out in any of these hearings, but it is a fact that certain districts on these canals, diverting from Friant on the Friant-Kern and the Madera Canals have what they call permanent 40 contracts. There are three districts that have a shorter term 90 con-

(Testimony of Clark Burnett.)

tract. Those three districts are the Madera, the Lower Tule, and Delano-Earlimart Districts. The policy is that all so-called permanent contracts will first be supplied with water; that any cut in water coming from Friant Dam comes from those shorter term contracts.

The district most suffering from lack of water under the project today is the Delano-Earlimart District. One well to be drilled in that district would cost twenty to thirty thousand dollars. So it——

Mr. Rowe: May I interrupt, your Honor, and ask counsel if he is testifying in this matter? If so, we want him to take the stand.

The Court: Well, I was beginning to wonder.

Mr. Abercrombie: Well, I would like to explain this. If [2752] counsel would like to disprove anything I say, I would be very happy.

The Court: I do not think it is up to him to disprove it.

Mr. Abercrombie: I will offer affidavits, your Honor, supporting what I say. But I would like to have your Honor understand what our position is in this matter. We are not here to quibble.

The Court: I think I understand it. I recall that in the last previous hearing there were some affidavits filed, showing or having a tendency to show that the river has already been over-committed or was over-committed a year ago for the water at Friant Dam. And, as I indicated in the opinion, it seems to me that the people between Friant and

(Testimony of Clark Burnett.)

Mendota had their rights; that they were prior and ahead of the rights of diversion at Friant——

Mr. Abercrombie: Some rights.

The Court: Well, all right. ——from the information before me then and the allegations of the complaint. Now, I do not intend to try this case on its ultimate merits at this time, counsel.

Mr. Abercrombie: I understand that.

The Court: This hearing is only for the purpose of determining whether an injunction shall issue out of this court to compel whoever turns the valves on Friant Dam to release sufficient water to preserve the crops which are threatened—20,000 acres, according to the affidavit, which are threatened [2753] to be destroyed if they continue to cut the supply of water.

Now, that does not mean that this court has any intention or is being asked—we are not being asked in this injunction to turn your river loose and let it waste into the ocean at all.

Mr. Abercrombie: The point I wanted to make particularly—and it has not appeared—is that the cut, if any, falls directly on the Delano-Earlimart Irrigation District and will cause terrific loss and damage. And that is why we are most interested in examining with care the requirements that the plaintiff asserts here.

With reference to my objection to Report No. 11, that has to do only with percolating waters.

There is no such urgency in regard to those waters, your Honor, in this proceeding as to require this court to issue the order out or ought to issue it. I do not think this court had that in mind on the earlier statement at the start of this hearing by counsel. So I do not think the Report No. 11 has any relevancy. The plate which your Honor had desired is in Report No. 12.

Mr. Rowe: I reserved the right to go slightly afield from my main premise, and I had intended to show counsel, after putting Mr. Boke on the stand——

The Court: Let us get on to trying our lawsuit.

Mr. Rowe: Okay.

The Court: Instead of making speeches. 11 and 12 are [2754] admitted into evidence and Mr. Rowe will supply a typewritten copy, and if, as and when copies of the plates in color are supplied, the original reports and the documents may be withdrawn. It will be up to either the State of California or the Government bureaus to supply those plates in color.

The Clerk: Your Honor, 25 and 26 are admitted into evidence?

The Court: Yes.

The Clerk: You said "11 and 12." Was that a prior exhibit?

The Court: No, those are Reports Nos. 11 and 12. Report 11 is 25 and Report 12 is 26. [2755]

* * * * *

ROBERT C. "RED" ARNOLD

resumed the stand and testified further as follows:

Cross Examination—(Continued)

* * * * * [2824]

Q. (By Mr. Boyd): Now you are familiar with the condition of the river as it was in 1943, Mr. Arnold?

A. I am familiar with it to the extent, as I say, whenever I pushed the button I had water and I never had to go upstream to look and see how much water was coming in the river. I never restrained from pushing the button because of any lack of water. Whenever I needed the water I pushed the button and there was water there. [2825]

* * * * *

The Witness: I would say yes. In talking with my father he said he irrigated when there was 50 second-feet flowing below the bridge at Friant.

* * * * * [2826]

Redirect Examination * * * * *

Q. (By Mr. Rowe): And is it the same marker?

A. Yes.

The Court: That is a photograph of it?

The Witness: Yes. [2828]

* * * * *

Q. (By Mr. Rowe): I now show you another picture, Plaintiffs' Exhibit for identification No. 36, and ask you what that is.

A. That represents the crossing above my property, leading out to Rank's Island.

(Testimony of Robert C. "Red" Arnold.)

Q. Point what on Plaintiffs' Exhibit 7-51-1?

A. May I see the map and check that? (Examining exhibit) A-2.

The Court: A-2 on Exhibit 24?

The Witness: Yes.

Q. (By Mr. Rowe): And that was on August 2, 1951, was it not? [2839] A. Yes.

Q. About what time of day?

A. I think that was around 9:30, 9:15.

Q. A.M.? A. A.M.

Mr. Rowe: I ask that that picture be introduced in evidence.

The Court: Very well. No. 36 in evidence.

(The picture referred to was marked Plaintiffs' Exhibit No. 7-51-36 and received in evidence.)

Mr. Rowe: That is all, Mr. Arnold.

The Court: Further cross examination?

Recross Examination

Q. (By Mr. Boyd): Mr. Arnold, do you know whether the bar about which Judge Hall questioned you earlier this morning——

The Court: That is the one at the head of Rank Island, No. 1.

The Witness: Yes. [2840]

* * * * *

JAMES E. COBB

resumed the stand and testified further as follows:

Direct Examination—(Continued)

* * * * * [2843]

The Witness: No. 5.

Mr. Rowe: Blue.

The Witness: Blue.

Q. (By Mr. Rowe): That is located where?

A. That is the branch of the river up on the north end that comes through to feed those three pumps to McCoon, Rank, and Arnold.

Q. Which is referred to also by the court and Mr. Arnold as point A-1?

A. A-1 on the first map.

The Court: There isn't any. Oh, that is not a pumping station?

The Witness: No.

The Court: That is your stake, No. 5?

Mr. Rowe: No. 5. [2874]

A. That stake don't amount to much. That was dry when we put it there.

Q. On what day?

A. On the 15th. On the 16th it began running, I just judge, from about 1 to 2 inches; and on the 2nd of August still running—I don't know—about 1 to 3 inches deep, about 18 feet wide. There was never enough there that you could do much of a

(Testimony of James E. Cobb.)

job measuring that I could see. It was running in the cobbles and some of the cobbles were extending out of the water and some of them under water.

The Court: I walked through it without getting my feet wet yesterday.

The Witness: You have a better idea than I have.

Mr. Rowe: May I ask the court if this is a picture of point No. 5? [2875]

* * * * *

CHARLES H. LEE

having been previously duly sworn, resumed the stand and testified further as follows:

Direct Examination—(Continued)

* * * * * [2893]

Q. (By Mr. Rowe): So, Mr. Lee, your plan would operate from April 1st to September 15 that you have designated the irrigation season, including scouring, with 123,814 acre-feet under conditions as they existed in 1951? A. Yes.

Q. Now the court asked you to determine at the last hearing what was the total first-class water contracted for by the districts to date. Have you got that figure?

A. Yes, 596,300 acre-feet of Class 1 water.

The Court: What is the figure, please?

(Testimony of Charles H. Lee.)

The Witness: 596,300 acre-feet of Class 1 water and 1,005,100 of Class 2 water. [2914]

* * * * *

The Court: Just assume there isn't any physical solution, and the dam stands as it is. How much water would be required to be released, and when?

The Witness: An average flow of about 2400 second-feet.

The Court: Well, an average flow 365 days a year?

The Witness: Yes, or its equivalent in a fluctuating flow. [2948]

Mr. McPherson: How many acre-feet or second-feet, again?

The Court: 2400.

Have you broken that down by months or seasons? You say an average flow of 2400 second-feet. Have you broken down the requirements for the irrigation season? [2949]

* * * * *

What I want to know, assume there isn't any physical solution at all, how much water would be required to be released from Friant?

The Witness: An average of 2400 second-feet, and the releases preferably to be in large flow during a portion of the year. [2950]

* * * * *

OTTO W. PETERSON

called as a witness by and on behalf of the plaintiffs, having been first duly sworn, was examined and testified as follows:

The Clerk: Your full name, please.

The Witness: Otto W. Peterson.

The Court: Is that P-e-d or P-e-t?

The Witness: P-e-t-e-r-s-o-n.

The Court: Your address? [2967]

The Witness: 6429 Harwood Avenue, Oakland, California.

The Court: Proceed.

Direct Examination

Q. (By Mr. Rowe): Mr. Peterson, you are an engineer, are you not? A. Yes, sir.

Q. Would you state your qualifications and experience?

A. Well, I graduated in civil engineering at the University of California in May of 1904.

Previous to that I worked for a period of 15 months on surveys, underground water tests and mapping of underground waters along the Los Angeles River in Southern California.

Following graduation, the first work was for the United States Geological Survey. Following graduation I worked for the United States Geological Survey for one year in the measurement of rivers and canals and the establishment of a number of gaging stations, mainly in central and northern

(Testimony of Otto W. Peterson.)

California, one station on the Colorado River above The Needles.

Then at the end of that year I went to Yuma, Arizona, was in the employ of the Bureau of Reclamation and for about six months was engaged as assistant engineer on surveys and design, and then was assigned to the watching of the Colorado River operations, the efforts of the California Development Company and the Southern Pacific Company, their plans to control the river. [2968]

The Court: At the border?

The Witness: At the border and in the valley.

I kept in touch with the directors and engineers and others because the Government was very much interested in the progress of that work, the plans.

I remained there until late in 1916. At that time the Rockwood Gate went out, but they succeeded in making the so-called Hind Dam closure.

Then I went to work as an engineer and superintendent for a contracting firm in Alameda County for some months, and was asked to go back to the Colorado River by the California Development Company and the Southern Pacific as an engineer first in efforts to get water across to the west side of the Imperial Valley from different sloughs, then on the enclosure of the river and finally I was in charge of the levees below the break in Mexico some several miles of levees.

Then I became ill and didn't work for some months. When I was able to return to work I was employed at Orland with the Bureau of Reclama-

(Testimony of Otto W. Peterson.)

tion and built a timber-rock barrier across Stoney Creek and the head works for a canal.

Next I went to work for the City of Los Angeles, Bureau of Public Works, on the Los Angeles Aqueduct, first as a camp superintendent and then as a division engineer in charge of a couple of divisions which I completed.

I next went to work for the Pacific Gas & Electric Company [2969] in the spring of 1913 in charge of construction of their power project, which was completed that fall.

The Court: Where is that?

The Witness: That is in Placer County above Dutch Flat.

The Court: It involved the building of dams?

The Witness: It involved a large earth dam, canals, pipelines, power house, and so forth. I had no connection with Spaulding Dam, but I spent a good deal of time there with the general superintendent of the company.

I again was employed by a couple of consulting engineers to make an evaluation of the properties of the East Bay Water Company, serving the East Bay territory, and carried on that work with a staff of accountants and engineers for about eight months, and was moved back to an assignment with the Bureau of Reclamation and the State Engineer to make an investigation and report on the Feather River basins in northeastern California with regard to irrigation possibilities, and also as to the elimination of sites for which large areas of public

(Testimony of Otto W. Peterson.)

lands were held up in proposed reservoirs which had no value.

That report was written jointly by Mr. E. T. Hobson, the supervising engineer and myself. We went over the ground, laid out the work and prepared the work.

Q. (By Mr. Rowe): Mr. Hobson, by the way, was the design engineer of [2970] Friant Dam, was he not? A. Pardon me?

Q. Mr. Hobson was the design engineer of Friant Dam?

A. He was the supervising engineer and all 'round capable man.

The Court: Did he design Friant Dam?

The Witness: No, sir. This is about 1915. He did work as a designer, supervisor. The Bureau at that time had a number of supervising engineers. I don't know that they have that organization now.

I next went to work for the Modesto Irrigation District as an engineer and under their consulting engineer had charge of the reconstruction and enlargement of the main canal and foothill dams for water regulation and structures along the route down to the limit of the district, and in the early summer of 1916 I was returned to the Pacific Gas & Electric Company, first for the so-called raising of Spaulding Dam. We raised the main dam and other dams 35 feet in elevation between summer and winter.

Following that I did other work for the company

(Testimony of Otto W. Peterson.)

in connection with its irrigation properties and power investigations, and so forth.

Next I went to Korea to be gone for 10 days over there, but it developed that I designed and obtained the permits and built a hydroelectric project for the American Mining Concession [2971] in northern Korea. It is not one of the large ones, it is a very moderate sized one, but it involved the building of a dam on a torrential river on which I was engaged for about 16 months. That work was under the supervision of the Japanese engineering organization, which is the same as the State Engineer or the State Bureau of Inspection that we have here.

Q. (By Mr. Rowe): You designed and constructed that dam? A. Yes.

Q. A hydroelectric project dam on a torrential stream? A. Yes.

Q. Not to interrupt you, Mr. Peterson, but your work was directly under the supervision, was it not, of the Japanese government?

A. It was under their control so far as engineering performance was concerned. I worked for the American Mining Concession.

Before leaving Korea I was employed as a consultant by a Japanese government group to visit a damsite in southeastern Korea, advised them about the foundations and the design of a dam primarily for irrigation, and I made a report to them giving them the dimensions and curvature and opinion about the site and probable cost of building a dam under their conditions of labor at that time. [2972]

(Testimony of Otto W. Peterson.)

Q. You were consulting engineer on design and also on cost estimates on this dam in southeast Korea?

A. Yes. That was, of course, a comparatively brief assignment.

Returning home, I was re-employed by the Pacific Gas and Electric Company. The immediate work at hand was the raising of Spaulding Dam, this time 15 feet.

The Court: The first was 35?

The Witness: The first was 35, and this was 15, bringing it up, I think, to 275 feet.

Q. (By Mr. Rowe): And who was the engineer in charge of that for the P.G.&E.?

A. I believe Mr. H. C. Vensano was the head of the engineering department.

The Court: Where is Spaulding Dam?

The Witness: Spaulding Dam is below Emmigrant Gap. It is approximately west of where that Southern Pacific train was trapped in the snow-shed.

The Court: Easterly from Sacramento?

The Witness: Yes. Just above Emmigrant Gap, between there and Cisco. On the south——

Q. (By Mr. Rowe): What was your position there?

A. On those two operations at Spaulding Dam, I was, in [2973] effect, a resident engineer. I represented both the construction and engineering departments at the site. The design, of course, was

(Testimony of Otto W. Peterson.)

made by the engineering department of the company and their consultants.

The first raising was very simple, because we merely built on top of the deck of the existing dam.

The second one required a thickening of the haunches, and was a more intricate job; and that dam is an arch dam structure.

There was about another year's work on power investigation, working on their irrigation properties, and so forth, and I went with the Shattuck Construction Company as chief engineer on shaft sinking and tunnel driving in Plumas County, and was on that work for about six months.

I then returned to the Pacific Gas and Electric Company as engineer of general construction, as of the first of 1921, and was employed for about 30 years in that capacity, first in charge of hydroelectric and steel plant construction, and subsequently practically all major construction, and supervision of maintenance of waterways on their irrigation properties.

Q. In other words, not to lead you, you have been, until your resignation or retirement at the end of 1951, chief construction engineer for the P. G. & E. for 30 years? A. 1950. [2974]

Q. 1950. A. Yes, then off and on——

Q. I mean you were chief engineer on construction?

A. Yes. The title was "engineer of general construction," but that in effect was what the work was.

The Court: In that capacity, did you build dams?

(Testimony of Otto W. Peterson.)

The Witness: Yes, sir, a number of dams.

The Court: On rivers in this vicinity?

The Witness: Yes. Built dams on the Pet River, Feather River, the Yuba, and several others, some 20 or 25 dams, more or less intermediate dams, from 60 to 170 feet high, or thereabouts; and of course there were a number of small check dams and crib dams, and so forth, in the way of dams.

The Court: Collapsible dams?

The Witness: Yes, we built some of those, and built some timber crib dams, in recent years.

* * * * * [2975]

The cribs were 7 feet 8 inches wide for most of the dam. At the central section they were 12 feet wide and 4 feet 6 inches deep. And there were three courses of 2 by 12 decking on the top of the dam. It was a wholly timber crib dam.

That is what all the dams I am talking about, the Pacific Gas and Electric dams, used, timber and rock entirely.

Q. (By Mr. Rowe): Did the Battle Creek Dam have collapsible gates? [2976]

A. Yes, it had collapsible gates, but they were manually operated.

Q. You are familiar with the Type 1 dam in Mr. Lee's report, are you not?

A. Yes. This is the nearest prototype we have to that particular dam—that I have.

Q. That includes what number of dams in Mr. Lee's report, that this one at Battle Creek is similar to?

(Testimony of Otto W. Peterson.)

A. Nos. 1 to 5, check dams, on the river.

Q. Now, did the P. G. & E. have any dams the same as Mr. Lee's Type 2 in his report?

A. If I might interrupt, we built a great many timber crib bridge structures and temporary diversion dams, which, to all effects, are similar in construction and objective to those used here, that is, in their types.

Then similar to Types 2 and 3?

Q. Similar to Type 2.

A. Type 2 is with the sheet piling upstream and downstream. We have—I say "we"; I have been associated with the work for so many years. A part of that is two dams, of the Type 2 class, where the Western Canal, which diverts water out of the Feather River below Oroville, crosses Butte Creek. There is an island in Butte Creek at that place; and instead of having an expensive structure, they simply built a timber deck dam, with flash-boards on the downstream side [2977] of the first channel, and another one where they crossed the second channel, and ran the water up around the waterway of Butte Creek.

Those dams raised the water—one of those dams is 96 feet long, the other is 48 feet long. The first raised the water—they have the hinged flash-boards. The first raised the water 8½ feet by flash-boards which are slipped in place from a walkway which the steel members carry when they are up.

The second structure raised the water 7 feet.

(Testimony of Otto W. Peterson.)

Q. How many dams in Mr. Lee's report are of this Type 2?

A. Well, there are five, and two are 7, and 7 are 14. Seven are Type 3, as I understand his report.

The Court: Seven of Type 2, and five of Type 1?

The Witness: There are five of Type 1, two of Type 2—No. 6 and 12—and the others are Type 3.

Q. (By Mr. Rowe): In other words, there are seven of Type 3? A. Yes, sir.

Q. And five of Type 1, and two of Type 2?

A. Yes.

Mr. McPherson: Maybe I am confused. The two dams you just referred to, on the Feather River, below Oroville, are similar to Type 2 of Mr. Lee's report?

The Witness: Yes. The dams on Butte Creek were built [2978] in—about 1930. I don't remember the year.

Q. (By Mr. Rowe): Now, with regard to Type 3, have you any collapsible-gate-type dams on the P. G. & E. system, Type 3 of Mr. Lee's report?

A. Well, we have a dam that is quite comparable, on the Feather River about five miles below Oroville, on the Marysville road, just off the road about three-quarters of a mile, which is used to divert water into the Western Canal.

That dam was built with sheet piling at the upstream toe, carried down to a clay or hardpan at a depth of about 18 to 20 feet; and the rest of the structure rests on round piles.

(Testimony of Otto W. Peterson.)

It has a timber deck and timber crib abutments—rock crib, I probably should say, abutments.

It has the hinged flash-boards similar to those that Mr. Lee proposes to use for his dams. These flash-boards raise the water 4½ feet when they are up, and the dam was unique in the fact that they had hinged aprons at the downstream edge of the dam, which serve more or less as a timber flash-board deflector, the idea being to sweep the water away without scouring the downstream side of the dam. They did, however, have riprap.

Q. How long is this dam on the Feather River, on the collapsible-gate side? [2979]

A. 272 feet long.

Q. And it raised the water 4½ feet?

A. 4½ feet, yes.

Q. What are the flood flows on the Feather River, at the location of this 272-foot collapsible-gate dam?

A. Well, there is a record of a maximum, one-day record, since that dam has been in place, since 1925, of 185,000 second-feet above Oroville. I would say——

Q. And that dam withstood that? A. Yes.

Q. This collapsible dam?

A. Yes. The dam pulled right down——

The Court: When was that 185,000 second-feet?

The Witness: That was December 11, 1937. And then there is another—that can be found in part 2

(Testimony of Otto W. Peterson.)

of the U.S.G. Water Supply Records Paper 1151 for 1947.

A probable actual——

The Court: For 1937?

The Witness: 1937, I should say. This paper was for the year 1947, but they go back and give the largest flows for a number of previous years.

The probable actual was in the order of, the momentary actual maximum was in the order of 200,000 second-feet.

Q. (By Mr. Rowe): And it withstood the flow—— [2980] A. Yes.

Q. ——of probably 200,000 second-feet?

A. Yes.

Q. And is that operated by a gantry crane?

A. The gates are raised and lowered by use of a gantry crane.

Q. And is this dam on the Feather River, this collapsible-gate-type dam, is it similar to the seven dams of Mr. Lee, known as Type 3 in his report?

A. Well, generally, yes. [2981]

* * * * *

Q. In your opinion can Friant Dam be raised, and if so, how many feet?

Mr. McPherson: We object, if your Honor please, incompetent, irrelevant and immaterial.

The Court: Overruled. You may answer the question.

The Witness: It can be built to a higher elevation.

* * * * *

(Testimony of Otto W. Peterson.)

The Witness: I would see no reason why it couldn't be built 50 to 100 feet additional height by an expenditure of money. [2987]

The Court: Would that require new foundations and toes?

The Witness: It would require excavation at the downstream toe along the entire downstream toe and to a satisfactory formation, and of course it would require also the building of supplemental barriers around the rim of the reservoir where the topography would be too low for a higher dam.

The present dam comes up to the limit of the topography immediately at the abutment, at the left abutment, and there are a number of factors, a number of construction features, that would be involved, but it is not insurmountable as a construction undertaking. [2988]

* * * * *

Q. (By Mr. Rowe): Mr. Peterson, this downstream addition, you said the unit cost would go from 1½ to 2½ times. Approximately what percentage of size of the original Friant Dam would your downstream addition be if you raised it 60 feet?

A. Well, I think, Mr. Rowe, it is necessary not only to keep—maybe you just wish that portion of the story. That addition would be in the order of 25 per cent at the most, 20 to 25 per cent, I would think. [2994]

* * * * *

The Court: Well, Mr. Peterson, have you made

(Testimony of Otto W. Peterson.)

any studies so that you have an opinion as to how much the dam would be increased in capacity if its height were raised 60 feet, as you have described?

The Witness: I have made no study, your Honor. It is manifest that, from the topography of the area, it would be a very substantial increase in storage, but I have not attempted to make such a study.

* * * * *

We have records, as I stated before, of timber lasting over a hundred years. We have some old timber dams that have lasted, untreated dams under less favorable conditions, [3001] for 60 years or more.

I think 100 years is within the reasonable possibilities; but I, in setting up a project of this kind, considering the possibilities of human failure to do certain things at the proper time, failure to keep up maintenance, and things that people do not fail to do where they handle a great many dams, still I think it is prudent, from a financial standpoint, to figure the life as 50 years.

Q. And according to good engineering practice for that type of dam, would it be figured at 50 years?

A. Yes, that is the way a private company would figure a dam of that type. [3002]

* * * * *

Q. Do Mr. Lee's dams meet engineering standards of private utilities on the Pacific Coast? [3004]

* * * * *

(Testimony of Otto W. Peterson.)

Q. Check dams.

A. For raising of water to moderate heights, such as those which are proposed on the San Joaquin River below Friant Dam.

Speaking from my own observations and experience in the company I have been with for a number of years—which probably has more experience with that type of dam than any other organization—I would say that our company in all probability would build dams substantially of the same type, except that it has been our practice to use all-timber construction, and they probably would go to treated timber for the deck. It produces the same result, substantially the same result financially, and from an engineering standpoint there are advantages pro and con of the timber and of the concrete.

* * * * *

To be conservative, I would say that we should take [3017] about 75 per cent of the original main cost, because the units of work that we are going to perform in this operation are less thousands of yards and less units, and that would tend to cause some increase.

So, as a generalization, we could say the cost would be in the order of 75 per cent.

Mr. Rowe: I would like to call——

Mr. McPherson: May I ask a question there, Mr. Rowe.

75 per cent of what figure, Mr. Peterson?

The Witness: 75 per cent of the cost of building the original main dam.

* * * * *

(Testimony of Otto W. Peterson.)

The Witness: ——I know from the record approximately.

Mr. Rowe: Mr. McPherson, at page 610 of the August 21st transcript, Mr. Boke stated the original cost was fifteen million dollars, the cost of Friant Dam. He first gave figures which would indicate it was ten million, referring to the cost of construction of Friant Dam. This is at line 16:

"The Court: Then the dam was about $10,000,000?

"The Witness: Around $15,000,000." [3018]

* * * * *

Q. Would you give the court your estimate of the cost of constructing the 14 dams proposed by Mr. Lee? [3040]

* * * * *

The Witness: No, that is for all of the dams.

My estimate totals approximately 3,000 cubic yards of riprap less than that used by Mr. Lee, which would amount, at $10 per cubic yard in place, to $30,000, resulting in a total deduction of $60,214, leaving my estimate of total cost as $1,072,286.

Q. (By Mr. Rowe): As against Mr. Lee's $1,100,000? A. Yes. [3041]

* * * * *

Q. (By Mr. Rowe): The total, then, of the cost of raising and lowering the gates, all of the operation of the dams, and the repair and maintenance, would be how much annually?

A. The total would be $16,400, the total estimated cost. [3045]

* * * * *

(Testimony of Otto W. Peterson.)

Q. Now here with Friant Dam, could you get regulation that would make these dams easier to operate than on the Feather River?

A. There is the opportunity for ideal operation at Friant Dam. The dam is a short distance above the sites of the proposed check dams and it would appear that good control could be obtained at that dam.

Q. But on the uncontrolled Feather River you find no great difficulty in operating the gantry crane and raising and lowering the gates?

A. No, we have operated there for many years without any regulation assistance from a nearby dam. [3049]

* * * * *

Q. (By Mr. Rowe): You don't have to use a diver suit to operate these gates, do you, Mr. Peterson? A. Pardon me?

Q. You don't need a diver's suit?

A. No. The operating platforms on the gantry crane are above the highest flood levels and there are platforms that drop down so that the men can stand downstream from the gate, the raised gate or the lowered gate, and engage a rod and ring with a hook and bring that up and use their engine to raise the gates, and they can be likewise lowered conveniently with the moderate amount of water going down river.

Q. Now returning to your cost estimate again, did you make any allowance for contingencies, and if so what percentage?

(Testimony of Otto W. Peterson.)

A. In the estimate for the 14 check dams, an allowance of 15 per cent was made for contingencies, and that was added to the total direct cost, and an additional 10 per cent was added for engineering.

Q. Is that engineering overhead?

A. Engineering overhead, design and supervision of dams while they are under construction, that is, inspection. [3050]

* * * * *

Q. (By Mr. Rowe): Mr. Peterson, in your opinion, how long would it take to construct these 14 dams proposed by Mr. Lee?

A. Well, the actual time of construction, from the time of its inception to completion, would be a period of four months.

Q. Four months?

The Court: All 14 of them?

The Witness: Yes, all 14 of them.

Q. (By Mr. Rowe): Now, how high do the floods on the American River go, where the rock crib dam was you mentioned yesterday?

A. The American River, that is the Folsom Dam, I think. [3055]

* * * * *

These dams will last 50 years; and when they are finished, or when that time expires, they may need to be replaced or improved, and so forth, but the object of good engineering is to buy service at the lowest over-all cost.

Q. And, in your opinion, do these dams of Mr. Lee's perform that function?

(Testimony of Otto W. Peterson.)

A. Yes, sir, they do.

Q. What other advantages, if any, do Mr. Lee's dams have?

A. They have a very distinct advantage, of offering no—practically no—obstruction to the flood flows of the river. These decks of these gates fold down, and you have a flat, practically flat, surface for the water to pass over, causing a minimum of turbulence there, and boiling, so that is a very desirable quality. They can stand a slight amount, or a moderate amount, of settlement or readjustment without injury. [3057]

With the gantry crane that is provided, they can be operated conveniently and economically to give the service when that service is necessary, both in the raising of the gates to check up the water to the desired levels, and to quickly lower the gates when it is necessary to have them dropped out of the way.

Also it is possible to operate and lower part of the gates, or a single gate, and leave the gantry rig out on the dam just back of the flow of the water, and to lower the gates on another day. But I assumed seven complete cycles, which may or may not be carried out by those who operate the structures as a complete cycle on a single day.

Q. How many hour would it take a crew to raise or lower one of the gates in these dams?

A. We find by experience that they can handle 50 feet, lineal feet, of gates per hour; and we also

(Testimony of Otto W. Peterson.)

find that in general—I should stop with my first statement. 60 feet per hour. [3058]

* * * * *

Q. Is there any danger that the center structure of the State's dam would wash out, and, if so, at what rate of flow in cubic feet per second?

A. At the higher flows of the river, in the order of, oh, 5,000 second-feet or more, depending on the bottom velocity and the turbulence below the sheet piling, I think the sacks of concrete would begin to move and wash out; and as the water would rise to a flow of upwards of 6,000 second-feet, with the removal of those sacks of concrete, there would be boiling and turbulence below the sheet piling, which could well take the sheet piling out, depending on the duration of the flood and the—mainly on the duration of the flood, the duration and intensity of the flood. [3059]

* * * * *

A. It would raise it slightly. I don't recall what pondage they have above these dams, but I think pondages would be quite minor. The dams would tend to silt up to the level of the lip of the sheet piling so that the pondage would be small. It would be small even without that silting, but there would be a tendency, a technical tendency, for an increased flow to move on to the next dam.

The Court: Do you know how long the State's dams would last before they would silt up? Would it be ten years, five years, or what?

The Witness: I would think in a single season,

(Testimony of Otto W. Peterson.)

depending on the amount, if there was enough flow in the river at certain stages to pick up fines out of the river bed and carry them in suspension, they would silt up very rapidly.

The Court: Say at a 6700-foot flow.

The Witness: A 6,000-or 7,000-foot flow?

The Court: Yes.

The Witness: I think the dams would probably go out in a flow of that order.

Q. (By Mr. Rowe): That is the center also?

A. Yes. [3060]

* * * * *

Q. (By Mr. Rowe): Mr. Peterson, did you ever design a series of dams [3062] on any river in California to deliberately create the effect that the State's plan would, in silting up?

A. Well, I had charge of dealings with the farmers in Potter Valley—that is out from Ukiah in Mendocino County—where erosion was becoming rather serious because of the introduction of water from the Eel River into the local drainage of the North Fork of the Russian River, and instead of going through expensive litigation the company I was with, the Pacific Gas and Electric Company, agreed to build about ten dams which I recommended, check dams. They were built to reduce the gradient of the river between the successive dams down through that valley. And they resulted in a rapid accumulation of debris up to the level of the dam. Any low dam or any check dam, a main canal, or even a substantial diversion dam in a

(Testimony of Otto W. Peterson.)

river like the Feather River, and our new project, will no doubt quickly show the effects of the moving of debris into that area.

Q. And was that on the Russian River, one of the forks of the Russian River?

A. It was on the North Fork of the Russian River, Adobe Creek, a feeder of the North Fork. Those were the streams that were affected.

Q. And, without trying to lead you, what did that do to the river bottom?

A. Well, it caused a deposit of debris above the [3063] spill lip of the dam in the river bottom upstream from the several dams.

The Court: It would fill them up to the level of the dam?

The Witness: Yes.

Q. (By Mr. Rowe): Would it create a series of steps down the river? A. Yes, check dams.

Q. And, in your opinion, if the State dams didn't wash out, would they be similar, would they fine up?

A. They would be very small steps, Mr. Rowe. There is only about one foot to a step.

The Court: But would they fill up? That is the point.

The Witness: They would fill up; yes, sir.

Q. (By Mr. Rowe): Would you have any ponds to pump from, from the State's plan, after a while?

A. I would say you would have very little pondage, negligible pondage, under this plan. [3064]

* * * * *

(Testimony of Otto W. Peterson.)

Cross Examination * * * * *

The Court: His question was whether or not Lee's dams would alter the river either by silting up or by degrading.

The Witness: I would say Mr. Lee's dams would not, that is, they would not because—when the flash boards are up we have two situations, one with the impounding of water. That will cause some silting of the bed. The release of water will scour that out. [3087]

* * * * *

Q. (By Mr. Abercrombie): No, what was the purpose of your employment?

A. Of my employment?

Q. Yes.

Mr. Rowe: I will object.

The Witness: To advise with Mr. Lee. [3089]

* * * * *

The Witness: I was asked by Mr. Lee to join in planning of his dams, review of them and their operation, maintenance and the conditions affecting the safe passage of floods over the structures and all matters generally pertinent to their installation and use. [3102]

* * * * *

A. A construction engineer primarily builds. In this case I reviewed the features of the design as well, based on experience. [3103]

* * * * *

(Testimony of Otto W. Peterson.)

Cross Examination

Q. (By Mr. Green): Mr. Peterson, you spoke yesterday of a number of timber crib dams that had been constructed under your supervision, is that correct? A. Yes.

Q. What generally is a timber crib dam?

A. Well, that is a dam generally with timbers running longitudinally across the river and timbers running up and downstream laced together, filled with rock or gravel to give it weight, and generally a structure which has a facing on both the upstream and downstream sides and a deck that is used generally for the diversion of water into canals.

Q. Canals and rivers?

A. Canals and—well, raising water. We don't divert water into rivers.

Q. But to raise the water above the river?

A. Yes, so it can be diverted into canals or for other purposes. And these structures are of varying heights, generally [3107] not more than 30 or 40 feet.

Q. Approximately how many of those have you either designed or have been constructed under your supervision?

A. Why, I would say 15 or more. [3108]

* * * * *

Q. I am talking about the ones that were designed by you or constructed under your supervision.

(Testimony of Otto W. Peterson.)

A. Yes. How many had collapsible gates? [3110]

Q. Yes.

A. Or reconstructed, I suppose you would include in that list?

Q. Yes.

A. I might come back with another question.

Purely of the collapsible type — do you include flashboards slipped into place?

Q. No, I am speaking of collapsible gates of the type used by Mr. Lee in his plan.

A. Just at the moment I think of four.

* * * * *

Q. (By Mr. Green): In other words, it is your opinion then as an engineer that the only dam that can be used in the San Joaquin River between Friant and Mendota Pool is a collapsible-gate dam?

A. I am not positive just where Mendota Pool is.

Q. In the locations suggested by Mr. Lee. [3111]

A. Where Mr. Lee has proposed the use of dams?

Q. Yes.

A. I think the structures which he has proposed, either with the concrete deck or with a timber deck, of the types he has proposed, are the most suitable and the most economical engineering structures to install. [3112]

* * * * *

The Witness: You can build various other types of dams. You can build a deck way up in the air, you can raise gates, you can have an elevated platform and have a pier every hundred feet, you can

(Testimony of Otto W. Peterson.)

do all manner of things, you can spend a number of million dollars there to build other types of dams, but this is the economical, effective and practical type of dam. [3113]

* * * * *

Q. And you went to the location of each of these dams to determine that that would occur?

A. I went along the river sufficiently to determine that much. [3117]

* * * * *

Direct Examination—(Continued) * * * * *

The Witness: The cutting of the brush is not desirable. It is just like the brush along the river banks. I went down to the river with several others last evening and we observed that where the brush is intact along the banks there is no erosion and where there is no brush whatever the banks are standing vertical and there is caving proceeding and more caving will continue depending on the length of period of flow and volume of flow. [3147]

* * * * *

Cross Examination * * * * *

The Court: He said 50 years was the prudent estimate of the life of the dam, that they might last as long as a hundred years.

Q. (By Mr. Goldberg): And you have assumed, of course, that the dams would be used for 50 years?

A. Yes. Well, I assumed that the dams would be used indefinitely, but as far as my own views are

(Testimony of Otto W. Peterson.)

concerned I don't know what developments may occur.

Q. Just assume, Mr. Peterson, that the dams are going to be required for only 10 years. Would you then so consider Mr. Lee's type of dams the preferable dams to use?

A. Yes, I do, because to raise the water to the height called for by his type of dams and to have them arranged so that the floods can pass over, I feel that that type of dam is best adapted even for 10-year service. [3185]

* * * * *

Q. Are there any other ways in which you could economize in building the structures?

A. I don't know of any other ways that you can do it with safety. You could put flash-boards out there and have a walkway and try to get out and take the flash-boards out and drop the beams down, but as I understand this situation it may be necessary to drop those gates on fairly short notice, and I think that nothing short of the gantry crane scheme is safe to use, that if you try to economize in the use of such equipment you could well have a disaster in the erosion of adjacent lands. [3186]

* * * * *

Cross Examination * * * * *

Q. (By Mr. McPherson): There is no limit on how high you can raise Friant Dam, is there?

A. I think I have stated it is practical to raise it 50 to 100 feet. There might be problems in raising

(Testimony of Otto W. Peterson.)

it to unlimited heights, although even those may not be insurmountable if cost is not a factor, too serious a factor. [3199]

* * * * *

A. Well, I stated that I thought his dams were safe for a flood flow of 50,000 cubic feet a second. Now if there were much in the river, all of that wouldn't pass over the dam. In other words, I feel that if there were 50,000 second-feet [3203] going down the San Joaquin River, those dams would remain in place with the gates down. [3204]

* * * * *

Q. Assume that the gates are up, the ponds created, and the water stands at a foot or a foot and a half higher at 4,000 second-feet flow, how much land would be inundated?

A. A very small amount of land. The location of the dams is such that, in general, the only place where the water backs out of the river channel is into some of the sloughs, the low-water sloughs.

Q. And when you say "not very much," how much do you mean? A. How much land?

Q. When you say "not very much," how much do you mean, 50 acres, 100 acres, 3,000 acres?

A. 50 acres, maybe. [3209]

* * * * *

Redirect Examination

Q. (By Mr. Rowe): Mr. Peterson, how does the Pacific Gas and Electric stand among private util-

(Testimony of Otto W. Peterson.)

ity companies on hydroelectric production? What is their size, one, two, twenty, or what?

A. I think it is one of the three largest hydroelectric companies, largest power companies. [3211]

* * * * *

Q. (By Mr. Rowe): Mr. Peterson, what was the total construction in dollars of the Pacific Gas and Electric Company, new construction, in the past five years?

* * * * *

The Witness: Approximately a billion dollars since the war period. [3213]

* * * * *

The Witness: The work I supervised in that period would be upwards of $600,000,000.

* * * * *

Q. Mr. Peterson, how many miles of waterways does the P. G. & E. have?

A. About 750 miles. [3214]

* * * * *

Q. The P. G. & E. is the larger private utility than the Southern California Edison Company, is it not? A. Very much so. [3215]

* * * * *

The Court: We shall see.

You may step down, Mr. Peterson.

By the way, while you are here, I indicated to counsel some time ago on this collapsible dam on the Feather River—is it, or the American River?

The Witness: The Feather River.

The Court: ——the Feather River was mentioned

that I would like to see it. Since then several counsel have suggested, and I think Mr. McPherson stated in court, that he would like also to see it, and I would like to be able to fix tentatively some date now when that can be done.

Would you be the one who would take us up there and show it to us?

The Witness: I would be very glad to go with you. [3216]

* * * * *

CHARLES H. LEE

recalled as a witness by and on behalf of the plaintiffs, resumed the stand and testified further as follows:

Direct Examination—(Continued) [3270]

* * * * *

The Court: All right.

Are you prepared now to answer the question, if no plan of physical solution is put into effect, how much water would be required to be released from Friant Dam to meet what you have described as the needs and demands of the riparian and of the underground area serviced by the San Joaquin River?

* * * * *

The Witness: Assuming no contracts between the U. S. Bureau of Reclamation and the irrigation districts or other entities to be served from Friant Dam, the schedule of releases from Friant reservoir

(Testimony of Charles H. Lee.)

to satisfy the rights of plaintiffs as to surface water and underground water from the [3282] San Joaquin River would require the full inflow into Friant reservoir up to the following amounts, for the various months of the year: [3283]

* * * * *

Cross Examination * * * * *

A. I determined it by various methods. The topography was taken into consideration, the surface topography, soils, geology as disclosed by well logs, airplane photographs. Various other lines of investigation were used in the determination of that line.

The Court: Did you delineate those in your direct examination?

The Witness: Yes, your Honor.

Q. (By Mr. Abercrombie): Why do you refer to it, then, as a topographic boundary, Mr. Lee?

A. I don't understand the question.

Q. What does the word "topography" mean?

A. Topography has to do with the variations in elevation of the surface of the ground. [3459]

* * * * *

A. Yes. An alluvial cone is built up by the deposition of debris eroded from the mountain watershed of the stream, carried by the stream out to the mouth of its canyon, and thence out onto the more level terrain beyond, where, as the velocity of the stream is decreased because of flatter slope, [3464] the carrying power of the stream decreases and the

(Testimony of Charles H. Lee.)

material is deposited, first the coarser material, the boulders, cobbles, and pebbles, then the finer materials, gravel, finer sands, silt, and ultimately the clays. [3465]

* * * * *

A. Yes. These intermediate streams, however, such as Dry Creek and Dog Creek and Fancher Creek were active enough to deposit material there which prevented the extension [3476] of the cobble deposits from the San Joaquin going further south and they limited the southerly extension of the coarser debris deposited by the San Joaquin, and similarly on the north. [3477]

* * * * *

Q. (By Mr. Abercrombie): Now if I understand you correctly, Mr. Lee, in building a cone such as either the San Joaquin or Kings River, the main channel in the river shifts from time to time, does it not, breaks over and goes in another direction? A. Yes. [3485]

* * * * *

The Witness: In stating there was interfingering, I have in mind that the deposits of the one stream, the San Joaquin, for example, would extend a little ways over in the Dry Creek cone, materials deposited by Dry Creek previously; and then there might be subsequently a storm of local origin in the Dry Creek watershed, in which the San Joaquin did not participate, and Dry Creek would bring down material and deposit it over, slightly over, for a short distance, onto the material previously de-

(Testimony of Charles H. Lee.)

posited by the San Joaquin. That is, the interfingering is not one of unlimited extent. It is of very limited extent. [3490]

* * * * *

Q. Mr. Lee, I have not asked what you have indicated. I am asking you whether, in your opinion, three-quarters of a mile was the greates encroachment of the San Joaquin on the Dry Creek cone during this process which you have described.

A. That is not necessarily the limit to which it occurred, but it is what might be termed, in my opinion, a reasonable extent for such overlapping of the San Joaquin upon the Dry Creek cone. But there may have been more. [3491]

* * * * *

A. Yes. In passing from the San Joaquin cone southward in the vicinity of what shows now as the topographic boundary, the cobbles deposits cease. Then again coming north from the Kings River, the cobble deposits there ceased at what is on the surface what appears as the modern boundary of the Kings River cone. [3499]

* * * * *

The Court: What is a cobble? I think you defined that once, but I have forgotten it.

The Witness: Technically defined it is a stone of two and a half inches, and greater up to 10 inches in diameter. [3501]

* * * * *

Q. (By Mr. Abercrombie): At any rate, is there

(Testimony of Charles H. Lee.)

any permeable material in the ancient cone of the San Joaquin River? [3741] A. Yes.

Q. And what is the permeable material?

A. Various types. Some just of sand, fine sand, medium sand, coarse sand, well-graded sand, uniform-sized sand; gravel, pebbles with sand, pebbles without sand, gravel without sand, gravel with sand; cobbles with gravel, cobbles with pebbles, cobbles with pebbles and sand, and so on. [3742]

* * * * *

A. Some types of cobbles in the San Joaquin have a tendency to weather, some do not. Some do not weather at all in the San Joaquin cone.

Q. Where do you find that type of cobble in the Ancient cone of the San Joaquin River, one that doesn't weather at all?

A. In the upper portion of the cone. [3744]

* * * * *

A. Piezometric.

Q. What does that mean? A. Pressure.

Q. Now irrespective of whether the well is delineated [3787] on Exhibit 62, do you know of any such well within the area shown on Exhibit 62, whether the well is shown on there or not — and when I say "such well" I mean a well showing the pressure surface different than the surrounding water level. [3788]

* * * * *

Cross Examination * * * * *

A. Yes. I was starting to explain that there are two principal sources of water in these cones. One

(Testimony of Charles H. Lee.)

is the water derived directly from the streams which built the cones up, and that water leaves the stream at various points, entering old channels at the various depths and following down those old channels and so distributing itself through the cone, that is, old buried aquifers.

That source of supply follows out in a fan shape distributing water through the cone at various levels.

The other source is the water brought in on the surface it ditches and that water feeds directly down from the surface [3813] where there is loss by seepage, from ditches or small distributaries and the irrigation in the fields. That water goes straight down and it fills the voids in the permeable materials, coarse materials, above any clay strata which there are and the water table then if formed in that manner.

Now there is the water table representative of the surface water from the ditches and there is the pressure surface, or piegemetric surface, which represents the level of the water as fed from tributary streams in the various underground aquifers.

* * * * *

Q. (By Mr. Green): Actually, Mr. Lee, there is within the Ancient alluvial cone of the San Joaquin River good communication, both laterally and vertically, is there not?

A. There is good communication within the aquifers laterally, but vertically the communication is not as good.

* * * * *

(Testimony of Charles H. Lee.)

The Court: Well, is the vertical communication better in the Ancient cone than it is in the Modern cone?

The Witness: Well, it is poor in both. I don't know that there is any better in one than the other. The vertical communication is poor in both. [3817]

* * * * *

Q. (By Mr. Green): ——on the Fresno side of the river.

As I have understood your testimony, there is a series of crossings and recrossings of the Ancient channels of the river that have formed that cone, is that correct, and by [3821] their alluvial deposits have built that cone up?

A. In general it is correct. It isn't correct as the lines are drawn on the blackboard. [3822]

* * * * *

Q. (By Mr. Green): Mr. Lee, as I understand your testimony, you want this court to understand that the communication between the San Joaquin River and the City of Fresno, or the portion of it somewhere over here on your Ancient alluvial cone, is excellent through these old channels of the river, which you must be assuming are present; is that correct?

A. There are various reasons which support that assumption. [3879]

* * * * *

Continuing with that answer, as evidence of the permeable formations which could act as aquifers both in the bluff and in wells penetrating, a well

(Testimony of Charles H. Lee.)

penetrating some almost 300 feet below the level of the river, there is also evidences of materials that could act as aquifers in wells to the south thereof within the confines of the cone.

Now there is also evidence in the fluctuation of wells throughout the area of the Ancient cone which is included in [3888] what is known as the northwest district of the Fresno Irrigation District. The district takes measurements of water levels monthly and those measurements indicate a response in the wells to the changes in the level of the river over that area.

For instance, in the dry period, a long dry period for 1923 to 1931, the Fresno Irrigation District diversions were 85 per cent of the average, but the San Joaquin River discharge was only 60 per cent of the average.

Now in the northwest district the water levels dropped 14.5 feet during that period as an average.

In the east district only 10.5 feet, and in the southwest district 10.2 feet.

The east district and southwest district are beyond the cone of the San Joaquin River.

Now in 1947 to 1950, another dry period, Fresno Irrigation District diversions were 89 per cent of the average, whereas the San Joaquin discharge was only 64 per cent of the average.

And in that period in the northwest district the drop was 22.8 feet, whereas in the east district it was 15.8 feet and in the southwest district 13.7 feet.

Then taking another aspect, toward the end of

(Testimony of Charles H. Lee.)

1934 the flow of the San Joaquin River began to increase in November, and wells in the northwest district began to rise in November, [3889] the wells in the east and southwest districts did not rise until January when the water was turned into the canals.

Still another aspect: In January 1946 the flow of the San Joaquin River increased from 1450 second-feet to 2340 second-feet and wells in the northwest district rose sharply 1.6 feet in January——

The Court: What year?

The Witness: This was January 1936.

——while the wells in other districts rose very gradually, less than .4 of a foot in the same time.

In February of that same year the flow of the San Joaquin decreased from 2340 to 1200 second-feet, and wells in the northwest district dropped .3 of a foot, while in the other districts they rose .6 of a foot.

Another aspect: The drop in the water levels from summer to winter during the winters when the flow of the San Joaquin River rose up to 1000 second-feet or more, it was less in the northwest district than it is in any of the other districts.

Take, for example, the winter of 1935-36, the wells in the northwest district dropped only .4 of a foot, whereas in the east district they dropped 2.9 and in the southwest district 1.5.

In the winter of 1936-37, wells in the northwest district didn't drop at all, but in the east district dropped 4 [3890] feet and in the southwest district 3.5 feet.

(Testimony of Charles H. Lee.)

In the winter of 1937-38, wells in the northwest district dropped 2 feet, but in the east district 5 feet and in the southwest district 4.5 feet.

In the winter of 1938-39, the wells in the northwest district dropped 2.4 feet, in the east district 3.4 feet and in the southwest district 3.2 feet.

In the winter of 1941-42, wells in the northwest district dropped 2 feet, in the east district 2.8 feet, in the southwest district 3 feet.

In the winter of 1942-43, wells in the northwest district dropped 3 feet, in the east district 4.4 feet and in the southwest district 4.3 feet.

In the winter of 1945-46, the northwest district dropped only 2.5 feet, while in the east district they dropped 3 and in the southwest district they dropped 3.

Mr. McPherson: Weren't all those computations shown on that exhibit you offered in evidence of the Fresno Irrigation District chart with a series of lines on it?

The Witness: The data which I have just read was shown on that exhibit. I have forgotten the number.

Mr. McPherson: So have I.

Mr. Green: 82, I think it is—no, 78.

Mr. McPherson: 78 is a photostatic copy of a chart incorporated in the 1950 report of the Fresno Irrigation District. [3891]

The Witness: Yes, that is the exhibit. And the water flow in the San Joaquin River by monthly averages is shown on Exhibit 79.

* * * * *

(Testimony of Charles H. Lee.)

The Witness: No. 78 is the water level fluctuations shown graphically, and No. 79 is the water flow shown graphically.

In addition to these instances which I have just stated, an examination of the water level fluctuations during 1936, '37 and '38 in State Report No. 11, which observations were made at frequent intervals throughout those two years, the important changes in the stage of flow of the river are reflected in the water levels in wells even where there are [3892] irrigation ditches, because the changes in the river level predominate. Those two years were years of large summer flow. [3893]

* * * * *

Now, if there was free vertical movement up or down, there would then be not a quick response throughout the cone, but there would be a slow, gradual building out of a ridge of higher water.

But when there is a response throughout the cone, it indicates it is a pressure transfer, and that means there is confinement, and not free vertical movement either up or down. [3896]

* * * * *

Q. But as to these four wells, 89, 90, 188 and 140, as I understand your testimony, you feel there is good lateral communication between those cobbles shown in each of those four wells?

A. I hadn't so stated.

Q. What is your opinion on that, Mr. Lee?

A. I think that here is the same degree of communication as there is throughout the cone. It is a

(Testimony of Charles H. Lee.)

heterogeneous mass with continuity of the water body but varying permeability so that the freedom of movement of water varies and within a section of channel where there had been no interruption or break the movement would be free, but whether or not the channel is continuous from 140, 188 to 190 or 89 or not, I have no opinion.

Q. Would you think, Mr. Lee, that pumping of well 89 would in any way affect the movement of water in the cobble bed of well 90?

A. I would desire to make a test before answering that question. Because of the heterogeneous character of the fill, it is not possible to determine without actual test as to whether it would affect or not.

The Court: By "affected' you mean immediate effect?

Mr. Green: No, not necessarily immediate, your Honor.

The Court: How do you mean?

Mr. Green: I mean affected——

The Court: Ultimately?

Mr. Green: Ultimately; yes.

The Witness: Well, if that is the question I did not so understand it. If that is the question then ultimately there would be an effect on various wells within the cone of any major change in condition of pressure or supply. [3941]

Q. (By Mr. Green): Because it is all one body of water?

A. It is all one formation and one body of

(Testimony of Charles H. Lee.)

water. My answer previously had assumed a rapid effect of one on another in pumping. [3942]

* * * * *

The Witness: ——I noticed the quick recovery after pumping, which is characteristic of pressure conditions. [4001]

* * * * *

Q. All right. Did you consider any other factors in relation to the graph in Report 11 which indicated to you that the wells were or were not pressure, other than draw-down and return?

A. I examined the location. A well right alongside of the river might recover quickly, and——

The Court: Without pressure?

The Witness: Without pressure—and I did not include such wells.

The Court: You did not include such wells?

The Witness: No. I included wells only where there was no obvious immediate adjacent source of supply to cause recovery.

Q. (By Mr. Green): I see. Was there anything else that you considered in these graphs, other than draw-down, recovery, and location, which indicated pressure to you?

A. That was the principal thing. I have made [4002] examination of many well records in the past, and have found a pattern, similar pattern, in well-fluctuation records, to obtain where there was a pressure condition.

Q. And that pattern——

A. And from my familiarity through many,

(Testimony of Charles H. Lee.)

many years of study of well-fluctuation records, that pattern is quite evident. [4003]

* * * * *

Q. Mr. Lee, what is draw-down of a well?

A. Draw-down of a well is the amount that the water drops in the casing when the pump starts to operate and to remove water from the well.

Q. And what is recovery?

A. Recovery is the amount the water rises after the pumping ceases. [4018]

* * * * *

A. There is the characteristic of these records that I see from my experience which indicates pressure conditions. [4023]

* * * * *

A. Well, there are two things that are shown by water level fluctuations in wells. If the well penetrates a water table, an unconfined medium, it reflects the water table. If, however, it penetrates below a confining stratum into a pressure zone below, then it reflects a pressure level. [4027]

* * * * *

Q. What is the source of the aquifer? Does the aquifer receive its recharge of water from the river or from this mound of water between the river and the city of Fresno?

A. Both. That is, if the aquifer is located under that mound. [4038]

* * * * *

Q. Now if at the point that there was intercommunication between the river and this aquifer, if

(Testimony of Charles H. Lee.)

the water surface in the river was lower than the underground water surface in this mound of water at the point where it communicated with the aquifer, it would then receive replenishment from the mound of ground water rather than the river, would it not? [4039]

* * * * *

Q. (By Mr. Green): In other words, Mr. Lee, it is your conclusion that in any aquifer such as we are discussing which has a pressure condition that can receive its source both from the free water table and from the river, that the communication is much better to that aquifer through the river horizontally than it is vertically from the free water table of the aquifer? A. Yes. [4040]

* * * * *

The Witness: No. My concept and my testimony has been to the effect that there is a water table and a pressure surface and the water table is the top water free. Below that there are confined aquifers or semi-confined aquifers in which there is pressure and if the tap was put down through that aquifer as in a well the water might rise to a higher level than the water table, it might rise to the same level or it might rise to a point below the level of the water table. [4042]

* * * * *

Q. You also show continuous clay beds commencing with the south bluff of the San Joaquin River and extending continuously completely across the alluvial cone of the San Joaquin River to its

(Testimony of Charles H. Lee.)

south edge. Do you consider that such clay beds actually exist unbroken?

A. They are indicated by the logs. There are clay beds that seem to persist right through. [4147]

* * * * *

The Court: By "perched water table" do you mean one that has a hardpan of impervious material immediately beneath it?

The Witness: Yes, sir.

The Court: For a certain area?

The Witness: Yes, your Honor. [4341]

* * * * *

Cross Examination * * * * *

Q. (By Mr. Goldberg): Now are the overflow sections to be raised and lowered at the same time as the non-overflow sections?

A. No. Ordinarily the overflow section would be raised and lowered and the non-overflow section would not need to be raised and lowered, only in case of a large release from Friant, either for scouring or for flood control. [4381]

* * * * *

Q. Calling your attention to sheet No. 1 of Exhibit 89 again, to the diagram, typical upstream elevation, you have the legend in that diagram showing the normal non-overflow section and the note on that to be collapsed only when the flow will exceed 8000 Cfs?

A. Yes, that would be a major flood. In other words, the overflow section, with the gates down, would carry up to 8000 second feet.

(Testimony of Charles H. Lee.)

Q. And when the flow came up to 8000 second feet those gates would be lowered?

A. Yes. [4386]

* * * * *

The Witness: I was stating that the releases that would be made from Friant in order to fulfill the requirements, current channel requirements for evaporation, transpiration, seepage and river pumping, and adjusted so as to maintain a [4454] net flow at Whitehouse in excess of 5 second-feet. Those releases should be of sufficient amount to fulfill those requirements, and it is estimated it will vary from 175 second-feet during December, January and February, to 400 second-feet maximum during July, for the conditions of diversion as of 1951. The July maximum will be greater when other riparian owners are pumping who did not pump during 1951. The ultimate during July may be as great as 500 second-feet. With all gates up, check dams will pass 750 second-feet.

That is in accord with Exhibit 115, which shows it in detail. [4455]

* * * * *

The Witness: I have no quantitative segregation as a result of analysis. There is this consideration, however, that weighs in my opinion, namely, that from 1936 to 1938 each year there was less water in the canals, diverted into the Fresno Irrigation District canals each year; whereas the San Joaquin River, the flow of the San Joaquin River, was much greater each year, progressively, 1937 over '36 and

(Testimony of Charles H. Lee.)

'38 over '37, and the wells in these diagrams in Exhibit—I think it is 59, or whatever it is.

Q. (By Mr. Green): 58, State Report 11?

A. State Report 11. ——these wells indicate a progressively higher level, almost all of them, within the cone of the San Joaquin River, in 1937 as compared to '36, and 1938 as compared to '37, which conforms with the conditions in the San Joaquin River with regard to supply and does not conform with the conditions in the irrigation ditches with regard to supply. [4711]

* * * * *

Q. (By Mr. Green): Mr. Lee, I wish you——

A. I wish to add further to the answer to the last question, in that the elevation of W would have to be more than eight feet above the river level in order that there be a flow to the river because that is necessary to overcome frictional losses and the aquifer would also have to be a perfect aquifer to permit of the back flow. That is, one which didn't leak. But that frictional resistance is necessary whether the flow is from the river down the aquifer or whether it is up the aquifer. Water cannot move until sufficient head is created to overcome the frictional resistance of the sand and gravel in the aquifer.

Q. Now, Mr. Lee, calling your attention to Exhibit 103, I believe that you testified previously that through the studies that the State of California made in Report No. 11 that it was determined that the contribution to the San Joaquin River from the

(Testimony of Charles H. Lee.)

Fresno Irrigation District in the year '36-'37 was 47.5 second-feet, is that correct?

The Court: Let me hear the question.

(The question referred to was read by the reporter as set forth above.)

Mr. McPherson: Per year, you mean?

Mr. Green: No, not per year. That is for the year '36-'37, that there was an average of 47.5 second-feet flowing [4784] into the river from the Fresno Irrigation District.

The Witness: Yes, that is the amount indicated in Report 11.

Q. (By Mr. Green): And you determined in Exhibit 103 that in '50-'51 there was 34 second-feet contribution from the Fresno Irrigation District to the San Joaquin River?

The Court: What year?

Mr. Green: '50-'51.

The Witness: That was the average of two determinations, one in February and one in October.

The Court: That is, October '51 and February '50?

The Witness: Yes.

The Court: Of two days each?

The Witness: Yes. The State's determination was through a period of time but these are single observations, one in February of '50 and the other one in October of '51.

Q. (By Mr. Green): Is it your opinion that 34 second-feet represents the average contribution in

(Testimony of Charles H. Lee.)

'50-'51 to the San Joaquin River from the Fresno Irrigation District?

The Court: Throughout the whole year?

Mr. Green: Yes.

The Witness: Approximately so, yes, in view of the fact that they are taken one before the irrigation season and one [4785] at the end of the irrigation season. [4786]

* * * * *

The Witness: Yes. The geology of the region, the cone formations, the existence of old channels in the old topography, the existence of cobble deposits in wells and lines radiating out from the apex of the cone, and the distance related with the cobble formations, sands and other water-bearing gravel formations. [4855]

* * * * *

The Court: All right.

(The record referred to was read by the reporter, as follows:

("Q. Mr. Lee, in the stretch of the river where contribution from the Fresno Irrigation District is occurring, does any water from the river seep under the Fresno Irrigation District from the San Joaquin? Do you understand that?

("A. Nothing to do with the Madera now?

("Q. Nothing to do with the Madera. In the stretch of the river where the San Joaquin——

("* * *

("A. Yes.")

(Testimony of Charles H. Lee.)

The Witness: Yes, in my opinion there is.

Q. (By Mr. Green): Is any of the water that seeps from the Fresno Irrigation District in that area water that originally came from the Fresno Irrigation District and fed into the river?

A. Well, if there was a stretch of river above the particular point under consideration where water from the Fresno side seeped into the river, it would mingle with the Friant water and the mingled water would obviously contain [4888] some of the water from above which issued from the Fresno side. [4889]

* * * * *

(The question referred to was read by the reporter as follows:

("Q. So that in two months a non-pressure well will return, won't it, Mr. Lee, when pumping stops? In fact, it may recover in a day?")

The Witness: Well, it would depend upon the circumstances, [4941] but generally a non-pressure well does not recover in a day. There were two measurements made of other wells in the vicinity by the observer, one about the 20th of June at well 12-20-1C and one about the 8th of July, and also in 12-20-2A and 12-20-1D, so that it would appear that it was observed by the man who was making the readings that pumping was occurring during that period in view of the fact that he measured all of the wells surrounding, and he must have visited that well during that 20-month interval, visited it at least twice. [4942]

* * * * *

(Testimony of Charles H. Lee.)

(Record read by reporter.)

The Witness: I don't know it, as a matter of fact. I would have to check up the tests.

Q. (By Mr. Green): Then if Peerless Pump Company only waited from 10 minutes to an hour before they made their measurements that they furnished to you, they may not have made accurate measurements; is that correct, Mr. Lee?

A. If they were measuring water table wells.

Q. And there are some water table wells down there, aren't there, Mr. Lee?

A. I think only the very shallow——

The Court: What do you mean, "water table wells"?

The Witness: Wells, which penetrate only to the water table and do not penetrate below a confining layer.

The Court: All right.

The Witness: It would only be a shallow domestic well.

The Court: The record, as the court will recall, is that he tried to get wells that were not pumping.

Q. (By Mr. Green): Mr. Lee, where did these river bottom pressure wells get their pressure?

A. Presumably they get it from the river.

Q. Well, do they get it from the high water table on the Fresno side? [4948]

* * * * *

The Witness: Yes, your Honor. I can show the location on another quadrangle.

(Testimony of Charles H. Lee.)

The Court: Of the river? Here is the well here in the Army Depot Field, is that right?

The Witness: Yes, your Honor. And it follows the general trend of the aquifers.

The Court: It would be up in that vicinity?

The Witness: Yes, in the vicinity of the northeast quarter corner.

The Court: The other, 46-A, 12-20-22A, the aquifers from the river, between the north quarter corner and the northeast corner of 11-12-20,—see, this is 12 South (indicating), and here is 20 East, and here is Lanes Bridge. Here is Section 11.

The Witness: Yes.

The Court: And that is a mile from the river?

The Witness: In one direction it is. In another direction it is only a half mile. But it is in the bottoms.

The Court: I understand your testimony to be, then, that the water level in the river in Section 2, lying immediately north of Section 11 — Section 2-12-20—is the portion of the river which, following the trend of the aquifer, would feed that aquifer, and that the water level in the river at that portion was higher in 1938 than the water level in well 12-20-22A, on page 46, at the same time in 1938.

* * * * *

Mr. Green: I have a pending question, your Honor, on the quantity of water which flowed in second-feet average in June of 1938.

The Witness: Approximately 13,640.

The Court: That is the average?

(Testimony of Charles H. Lee.)

The Witness: Average for the month of June, 1938.

Q. (By Mr. Green): That is the highest monthly average ever reached, is it not, Mr. Lee—no, 1911 appears to be higher.

A. No, the average in June 1911 was 15,900. The record does not go back of October of 1907. There were large discharges in the Kings River in 1906 which would have also produced a large runoff in the San Joaquin River in 1906.

Mr. McPherson: What was that? Would you read that answer?

(The record referred to was read by the reporter as follows:

("A. * * * The record does not go back of October of 1907. There were large discharges in the Kings River in 1906, which would have also produced a large runoff in the San Joaquin River in 1906.")

Q. (By Mr. Green): With the exception of 1911 then, since 1907, June [5142] of 1938 is the highest that the river has ever run for a one-month period?

A. Average for a one-month period; yes.

Q. You have previously testified that it is the sustained flow which produces water in these aquifers and not just a quick flash flood such as existed in December of 1937, isn't that correct, Mr. Lee?

A. Yes, except to the extent of the flooding of lands which absorb during the high floods and hold and gradually feed down. There are large quanti-

(Testimony of Charles H. Lee.)

ties of water absorbed at such times that there is high floods even for a few days.

The Court: You mean the water gets into unsaturated banks?

The Witness: Yes, your Honor. The area has enormously increased, what we call the wetted area, and it if enormously increased at the time of high floods even though for a short period of time, and soil not saturated becomes saturated.

The Court: By the way, has anyone figured the average surface of the water at Sample's ranch for the year 1938? In looking this chart over it seems to be 284 above or immediately under it all through the year, every day. I see several entries 279.9, point 8, point 7, and 279.1 appears to be the lowest and that only for one day.

Has anyone computed that elevation at Sample's ranch for that year? I suppose it will run around 280 or 281. [5143]

* * * * *

The Witness: Yes.

The Court: What factors would cause it to be greater on one side or less on the other?

The Witness: Well, I have just indicated one factor. There is much heavier pumping on the Fresno side than there is on the Madera side above Herndon.

The Court: Below?

The Witness: Below and above, yes.

Mr. Rowe: Below where?

The Court: Herndon.

(Testimony of Charles H. Lee.)

Mr. Rowe: I thought he said above.

The Court: He says now above and below.

The Witness: I wish to qualify that. There is pumping on both sides below Herndon. Above Herndon the pumping on the Fresno side is very much greater than on the Madera side so that the pull on the aquifers from the river would be greater on the Fresno side than the Madera side, causing a greater proportional loss to the Fresno side than the Madera side above Herndon. I think below Herndon it might be about equal, about 50-50.

The Court: The shape and the size of the Ancient alluvial cone of the San Joaquin and its relation on the north to the cone of—I cannot remember the next river.

The Witness: Cottonwood Creek. [5164]

* * * * *

The Court: Let me ask you this question: Have you put on Exhibit 30 all of the wells, the records of which you have examined or considered which you consider show themselves to be influenced by the San Joaquin River lying on the Fresno side?

The Witness: No, your Honor. Only those in State Report No. 11.

The Court: Very well.

Mr. McPherson has still out some exhibits, I believe.

Mr. McPherson: That was D and E, was it not?

The Court: I do not remember.

Mr. Green: That is right.

Mr. Goldberg: D and E are the ones I returned.

(Testimony of Charles H. Lee.)

Mr. McPherson: I withdrew them when Mr. Goldberg was not in attendance.

The Court: Very well.

Mr. Green?

Cross Examination—(Continued)

Mr. Green: I believe we had a pending question.

The Court: Had you completed it?

Mr. Green: The question was on page 5175 of the transcript and I believe that I had completed the question.

The Court: Very well. [5193]

* * * * *

The Court: Well, we have allowed for that later factor in the 15 second-feet, so that you figure a little less would be as much as 17 second-feet, the difference between 47 and 64?

The Witness: Yes. Well, 15 as against 17.

The Court: Mr. Lee, assume an average flow of 2500 second-feet, which you have assumed in submitting the plaintiffs' plan of physical solution; assume that, but without assuming the dams along there: How much water, in your opinion, seeped out—gross, not super gross—how much water seeped out of the San Joaquin River between Friant and Whitehouse, in any one of the years, or an average of years, during, say,—before diversions; when was that? When did they start the diversion up there, 1947?

Mr. Green: 1944.

(Testimony of Charles H. Lee.)

The Court: 1944. Say assume that for a 10-year average.

The Witness: May I have the question?

The Court: I will restate it.

Assume an average of 2500 second-feet flow past Friant, for the 10-year average before any diversion at Friant, which occurred, as I understand it, in 1947; assume those 10 years from 1937 to 1947: How much water, in your opinion, seeped out of the San Joaquin River between Friant and Whitehouse, in each of those years, or on each day, let us say? [5246]

* * * * *

The Witness: Yes. At least 150 second-feet.

The Court: Is that super gross?

The Witness: Beg pardon?

The Court: Is that super gross, which I understand considers the inflow and the outflow, as the water——

The Witness: No, this is gross.

The Court: Then there would be added to that such water as would flow in from the Fresno Irrigation District and flow out, between gauging stations?

The Witness: Yes.

Mr. Abercrombie: Is that exclusive, your Honor, of pumping and transpiration and evaporation? Is that seepage alone?

The Court: Seepage alone, was my question.

Mr. Abercrombie: Not including pumping or other diversion?

(Testimony of Charles H. Lee.)

The Court: Seepage alone.

That was your answer?

The Witness: That was my answer.

Q. (By Mr. Green): Mr. Lee, what did you use as your reference in answering that question? What did you refer to as you were answering that question? A. Exhibit 104. [5248]

* * * * *

A. I think that situation could exist.

Q. Does it exist, in your opinion?

The Court: Water in the river flows out before it mingles with the water already in there?

The Witness: Before it mingles completely, your Honor, with water all across the broad width of the channel, and some of the water being in other sloughs or other branches of the river, also. I am talking about complete mingling.

The Court: Just a general mingling.

The Witness: It is a gradual process. One can see it by putting in——

The Court: Dye?

The Witness: ——dye, or clay in suspension, on one bank, and it gradually spreads out, and it may be a considerable distance downstream before the whole stream attains a uniform appearance.

Q. (By Mr. Green): Mr. Lee, do you visualize that at any point in the San Joaquin River, on the south bank, that water flows into the river from the Fresno Irrigation District and, in the immediate

(Testimony of Charles H. Lee.)

area where it flows into the river, it flows out again in a lower aquifer?

A. Yes, within the distance over which the full mingling would occur. [5356]

* * * * *

Mr. Child: That is all right. I still want to know if the cone looks like this exhibit you have on the blackboard underneath there.

Mr. Rowe: I will show it to him.

(Exhibits document on blackboard.)

Mr. Rowe: Is that what you mean?

Mr. Goldberg: You mean Districts' C-1.

Mr. Rowe: C-1.

The Court: Well, the witness testified that that is typical of a cone in the San Joaquin Valley.

Mr. Rowe: When I get on redirect, I will go into Madera a little bit.

Q. (By Mr. Child): Take, for instance, in your Exhibit 80, the time from December 1, 1946, to December 1947, and assume—or isn't it a fact that the blue area represents bank drainage and the red bank storage? A. Yes. [5401]

* * * * *

Q. (By Mr. Child): Changing the subject, Mr. Lee, as I understand you the northwest area of the Fresno Irrigation District is, in [5527] your opinion, regularly replenished by the San Joaquin River; is that correct?

A. Yes, that together with the water from irrigation.

Q. Do you maintain that the ground water con-

(Testimony of Charles H. Lee.)

tour maps, as are in evidence as Exhibit 73, showing the slope of the ground water surface toward the San Joaquin, have little or no bearing upon this area?

* * * * *

Q. (By Mr. Child): Do you feel that the condition reflected by the maps has little or no bearing upon this area?

Mr. Rowe: That is, the ground water contour maps?

Mr. Child: That is right.

The Witness: Well, the question is not very clear to me. I might say that in some areas the contour, water contour maps show the perched water table immediately adjacent to irrigation ditches, where the ditches are in soils which are absorbent, rather than showing the general pressure surface.

* * * * * [5528]

A. In some locations the ground water contour maps above Herndon indicate local perched water table and in others they show the general situation of the pressure surface fairly well. [5531]

* * * * *

Mr. Green: I move to strike counsel's remark. It isn't an objection, it is just mouthing.

Mr. Rowe: A pretty good piece of mouthing, though.

Mr. Child: I would like to have a ruling on it.

The Court: It is stricken. If counsel thinks it is important, he can put it in on redirect.

(Testimony of Charles H. Lee.)

Q. (By Mr. Child): I think you marked your cone on Exhibit 73, the 1948 map.

Now will you point out for me——

The Court: Let me see, this is one that Professor Smith used his black pencil on, is it?

Mr. Goldberg: I don't think so.

Mr. McPherson: It is 73-B, which is the document the witness has before him.

Q. (By Mr. Child): Now will you point out for me which area the contour map shows is affected by the perched water table?

Mr. Green: Which area reflects a perched water table.

Mr. Child: Which area reflects a perched water table.

Mr. Green: Where are the crayons?

Mr. Rowe: We haven't been told that we would be ready on this, so take your time, Mr. Lee. [5534]

* * * * *

The Witness: In order to circumscribe it, the areas of perched water table, a study would have to be made of individual wells and there are some wells on this map which appear to have been used in the preparation of the contours which are alongside of the irrigation ditches and the water level in such wells indicates in some instances a perched water table condition. It would take a study of the individual wells to outline it.

Q. (By Mr. Child): Have you made a study of the wells that indicate a perched water table?

A. In some instances, yes. Some years wells

(Testimony of Charles H. Lee.)

along certain ditches are used in the preparation of this map and in some they are not, and where such wells are not used the [5535] condition of perched water table does not appear. Where they have been used it does. There was a difference in the procedure in the State Engineer's office in the preparation of the maps and the use of the wells.

Q. As I understood you, these contour maps reflect a perched water table, don't they?

A. I said in certain areas they did—— [5537]

* * * * *

The Court: Read the witness' answer.

(The record referred to was read by the reporter as follows:

("The Witness: Yes, with the comment, regarding that answer, that some of the areas on the maps, the ground water contour maps, within the Fresno Irrigation District, in some years are indicative of the perched water table.")

The Court: In the northwest district?

The Witness: Yes.

The Court: Go ahead, Mr. Child.

Q. (By Mr. Child): Now, will you show us, on the contour maps, where the contour maps reflect this perched water table in the northwest district?

Mr. Rowe: Take your time, Mr. Lee.

The Witness: In order to do that, I will need the ditch maps, and also the records of the individual wells. [5541]

* * * * *

(Testimony of Charles H. Lee.)

The Witness: Yes, it will take probably two or three days, including all of the 30 ground water maps.

Q. (By Mr. Child): Well, what did you base your studies on, Mr. Lee?

A. I based the studies on some of the ground water maps. I based the studies on the ground water maps, different maps for differing purposes.

Q. And in your opinion they show that there was a perched water table?

A. Well, I encountered conditions of a perched water table on a number of the maps. [5542]

Q. Do you recall what those maps were?

A. I think almost every year.

Q. Almost every year. And one other question: What is your definition of a "perched water table"?

A. A perched water table is a water table above the general level of the water table or pressure surface.

Mr. Rowe: What do you mean by "perched," counsel?

Q. (By Mr. Child): Isn't that where there is a water table perched above an impervious material, then an unsaturated area, and then a water table below that?

A. In some instances; and in some instances a perched water table is above the material which is saturated but supported by pressure. That is, it is above the pressure surface. [5543]

* * * * *

(Testimony of Charles H. Lee.)

Q. (By Mr. Child): Before lunch, Mr. Lee, we were discussing your statement that the ground water contour maps reflected a perched water table in the northwest area of the Fresno Irrigation District. Have you been able to point that out on the ground water maps?

A. No. As I stated before lunch, it would take some considerable time to outline the portions of the area within the northwest district of the perched water table.

Q. Upon what did you base the statement that the contour maps reflected the perched water table in the northwest area of the Fresno Irrigation District?

A. Well, one thing was the occurrence of narrow, high, apparent ridges in the water table along ditches.

Q. Anything else?

A. Yes, the elevation of the water table within the cone of the San Joaquin River at certain points at higher elevation than the water level at the head of aquifers would [5547] cause it to be.

Q. In the northwest district? A. Yes.

Q. Anything else?

A. If I recall it, on some area maps there were isolated mounds in addition to narrow ridges as indicated by the ground water contours.

Q. Isolated mounds in addition to narrow ridges. Anything else, Mr. Lee?

A. Well, in locations where there were parallel ridges not a great distance apart there were broader

(Testimony of Charles H. Lee.)

ridges, that is, in some instances there would be one ditch with no others in the vicinity along a narrow ridge of ground water which would appear on the map, and in other areas where there were parallel ridges you had a broader ridge.

Q. That indicated your perched water table?

A. Yes, built up by two parallel ditches.

Q. You have given me four now. Is there anything else?

A. There are variations of those four indications and results therefrom.

Q. And may I have what those variations consist of, where they are located?

A. Sometimes the ridges, instead of being a uniform width, would have varying widths due to wells located on branches of the ditches or other causes. * * * * * [5548]

And the resulting condition of the perched water table due to irrigation is a temporary return flow to the river from the perched ground water as fed by irrigation. This appears in the river as foreign water, return water of a temporary condition, temporary situation, and as the subdrainage of the district proceeds by pumping from the confined aquifers as penetrated by wells, this perched water will be drawn down and extracted and salvaged and the foreign water will then no longer appear in the river as return water.

Q. That isn't reflected by the water contour maps, this last statement?

A. That last statement is one of the results that

(Testimony of Charles H. Lee.)

I said I judged by as a result of the condition of perched water.

Q. Can you point out a single example of that on the water contour maps?

A. Yes, progressively during the last 10 years the development of pumping from wells west of the Fresno Irrigation District and up into the northwest portion of the Fresno Irrigation District has drained off the perched water above the pressure surface of the river by underdrainage so that the water table, the ground water map, the contours, now as compared to 10 years ago indicate a highly different situation, one instead of the ground water contours opposite the [5549] river on the south being higher they are now lower than the river.

That condition is progressing upstream and has extended into the Ancient cone and has each year been progressively going further upstream so that utimately the perched water will be entirely drawn off by subdrainage and the condition of the perched water table will be very much less in evidence.

* * * * * [5550]

The Witness: Well, perched water, water which is free has a water table over it.

The Court: Water which is free has a water table that is the top of the free water?

The Witness: Yes. [5555]

* * * * *

Q. (By Mr. Child): Once the perched water comes in contact with the free water or the pressure water, it ceases to be perched, does it not?

(Testimony of Charles H. Lee.)

A. It can be perched on top of material saturated by pressure from below or it can be perched upon the top of an impervious layer of clay or other impervious material. There are two types of support for perched water. [5559]

* * * * *

A. Yes, with the exception that I before mentioned, of the use, in addition, of waters from the San Joaquin by Tranquillity and James Irrigation District.

Q. (By Mr. McPherson): That is to say, in your opinion they receive some of their underground supply from the San Joaquin River?

A. It is my understanding they receive some surface supply, also.

Q. Was your answer directed to the surface water, or the underground water? [5610]

* * * * *

The Court: In your opinion is the southerly portion of the San Joaquin River cone covered up by so-called Modern alluvial deposits coming from the cone or cones of Dig Creek, Fancher Creek, Dry Creek, Red Bank Creek and the Kings River?

The Witness: Well, as I said previously, I think that there is a certain degree of interfingering of deposits from adjacent streams as they built up their respective cones and the deposits from Dry Creek, being more recent than those of [5759] the San Joaquin, may overlie the former deposits of the San Joaquin to a certain extent, particularly in

(Testimony of Charles H. Lee.)

the area in the vicinity of Fresno and to the east of Clovis and possibly to the west of Fresno.

In so far as the Kings River depositing over the San Joaquin, in my opinion that did not occur. The cobble deposits of the Kings River terminate too far to the south to have indicated the stream going to the north and depositing over Dog Creek and Fancher Creek and Dry Creek and on to the San Joaquin. [5760]

* * * * *

Q. (By Mr. McPherson): Mr. Lee, one more question before we proceed to that. Can you tell us whether, in your opinion, the northern boundary of the cone of the Kings River and the southern boundary of the cone of the San Joaquin River have ever met?

A. In my opinion, in so far as the surface indications are concerned they have not for the reason that Dry Creek and its channels extend between the Kings River and the San Joaquin to the trough of the valley.

Now at the lower end, the extreme western edge, there may be some interfingering of the Kings and the San Joaquin beneath the Dry Creek deposition which is visible in the topography, but the meeting, if there is such, would be a limited meeting and to the extent of interfingering in that western area toward the trough.

Q. And at a very great depth, I take it?

A. Well, at some depth. I don't know how great, but at some depth. [5801]

* * * * *

(Testimony of Charles H. Lee.)

Mr. McPherson: I think, to make the question accurate and consistent, I think we bounded it by the eastern line of the Fresno Irrigation District.

The Court: Yes, the eastern line of the Fresno Irrigation District.

The Witness: Yes, there is both a water table and a pressure surface in that area, with the exception of any local area to the west near the trough of the valley, where clays may be absolutely impermeable, so that a water table does not form; but those would be local, and confined to the trough of the valley. [5923]

* * * * *

Q. In other words, a well penetrating a confined aquifer, a well or wells penetrating a confined or semi-confined aquifer sufficiently confined to produce hydrostatic pressure, would reflect the aggregate pressure of the aquifer in those wells penetrated irrespective of the ground water table, isn't that correct? A. Read the question.

(The question referred to was read by the reporter as set forth above.)

The Witness: Yes, it would reflect the pressure in the aquifer at the point penetrated.

Q. (By Mr. McPherson): That is correct.

A. Not necessarily the aggregate, but at the point penetrated, and that pressure surface, with the continuation of it in a given position for a period of time, would ultimately represent the water table. [5925]

* * * * *

(Testimony of Charles H. Lee.)

The Court: What is the line that was left out?

The Witness: I don't know, your Honor. I have the same reprint from which this photostatic copy was taken, but I haven't the original proof sheet. That was many, many years ago.

The point that I wish to bring out is that if the pressure surface is above the water table at the time I wrote the paper then I use it to be termed "artesian."

The Court: Instead of "normal"?

The Witness: If it is the same as the water table, then it is normal. And if it is below the water table then it is subnormal.

So with that line in there, which apparently was not caught in proofreading, the paragraph would agree with the rest of this paper.

The Court: In other words, if the static level in a confined aquifer is above the water table it is termed "artesian"?

The Witness: Yes. That should have been in there with some following words which would make a line.

The Court: But if it is equal with the water table it is called "normal"?

The Witness: Normal; yes, your Honor.

The Court: And if below, subnormal? [5953]

The Witness: Subnormal; yes, your Honor.

* * * * *

A. The water level in a well which is fed from the free water table, which is in a homogeneous stratum, drops slowly as the pumping continues

(Testimony of Charles H. Lee.)

and as water is drained out from around the well and the flow develops toward the well. The water level also recovers slowly.

In a pressure well, on the contrary, the water level drops rapidly when pumping starts, and it rises rapidly when pumping ceases. [5959]

* * * * *

Q. (By Mr. McPherson): Mr. Lee, we agreed this morning that a water table would not form except in permeable areas, and that the water table was the surface of the zone of saturation.

The Court: The first one reached.

Mr. McPherson: Yes.

The Court: From the surface of the ground.

Mr. McPherson: Yes.

Q. Now, you agreed to that this morning.

Now the question I am asking you is whether you wish this court to understand that, in your opinion, there is any means, engineering or otherwise, hydrologically, geologically, or by any other science you know of, by which you can separate and have us deal with the water that went into the underground and is now part of the water table, as a separate entity apart from that which was there before any irrigation took place.

A. No, but before irrigation occurred, the river fed outward from the channel.

The Court: Southerly?

The Witness: Southerly. After irrigation had occurred for a while, the water table—the body of the water built up so that the water table was above

(Testimony of Charles H. Lee.)

the river, and above the river westward, west of the west boundary of the Fresno Irrigation District.

But beginning in the early '40s, the point at which water escaped from the river began to move upstream, and by 1948 it had moved upstream above the west boundary of the Fresno Irrigation District, and since then has moved up almost to Riverview Station. That is last fall; I don't know what it is now——

Mr. McPherson: Mr. Lee——

The Court: Let him finish.

The Witness: It moved almost to Riverview Station, indicating that the accumulation of water from irrigation over and above the original ground water surface had been drained off, and that the river had again resumed its feeding directly to the south and into the cone of the San Joaquin River.

Mr. McPherson: May we have a recess?

The Court: Granted. [5976]

(Short recess.)

The Court: Proceed.

The Witness: Just before the recess, I didn't quite finish the answer and——

Mr. McPherson: Will you read the whole answer so I can understand it then, if you are going to change it.

Mr. Rowe: He didn't say he was going to change it.

The Court: What is the question? Read the question before you read the answer.

(Testimony of Charles H. Lee.)

(The record referred to was read by the reporter as follows:

("Q. Mr. Lee, we agreed this this morning that a water table would not form except in permeable areas, and that the water table was the surface of the zone of saturation.

("The Court: The first one reached.

("Mr. McPherson: Yes.

("The Court: From the surface of the ground.

("Mr. McPherson: Yes.

("Q. Now you agreed to that this morning.

("Now the question I am asking you in whether you wish this court to understand that, in your opinion, there is any means, engineering or otherwise, hydrologically, geologically, or by any other science you know of, by which you can separate and have us deal with the water that went [5977] into the underground and is now part of the water table, as a separate entity apart from that which was there before any irrigation took place.

("A. No; but before irrigation occurred, the river fed outward from the channel.

("The Court: Southerly?

("The Witness: Southerly. After irrigation had occurred for a while, the water table—the body of the water built up so that the water table was above the river, and above the river westward, west of the west boundary of the Fresno Irrigation District.

("But beginning in the early '40s, the point at which water escaped from the river began to move upstream, and by 1948 it had moved upstream above

(Testimony of Charles H. Lee.)

the west boundary of the Fresno Irrigation District, and since then has moved up almost to Riverview Station. That is last fall; I don't know what it is now——

("Mr. McPherson: Mr. Lee——

("The Court: Let him finish.

("The Witness: It moved almost to Riverview Station, indicating that the accumulation of water from irrigation over and above the original ground water surface had been drained off, and that [5978] the river had again resumed its feeding directly to the south and into the cone of the San Joaquin River.")

Q. (By Mr. McPherson): Now you wish to add something to that? A. Yes.

And during this period when the water table from irrigation had been built up and was above the river level there was still a discharge from the river feeding south into the lower aquifers and this was drawn upon by pumping wherever pumping took place. The pumping consists of an under-drainage. It draws directly from the river through the lower aquifers and also directly from above the water that had been built up by irrigation, so that there was not a cessation of feeding south from the river during the period when the water table had been built up by irrigation.

Q. Now I want to be certain I understand one part of that answer.

Did I understand you to say in that answer that before irrigation and at a time when you stated the

(Testimony of Charles H. Lee.)

river was feeding the ground water to the south that it at any time ever stood anywhere higher than the river level?

The Court: It? I fail to identify "it."

Mr. McPherson: The water table as it then existed before irrigation while it was being fed, as he said, to the south by the San Joaquin River. [5979]

* * * * *

Q. (By Mr. McPherson): Is it your opinion, sir, that anywhere in the area marked I and II on Exhibit 62, that there is a perched water table below the surface of the zone of saturation?

A. Well, there are two classes of perched water. The one is a body of water which is supported by an impervious formation underneath it, below which is a nonsaturated zone, with a water table below the zone of nonsaturation.

The other class, which is referred to by Meinzer is a number of instances, and other writers—Meinzer terms it a semi-perched water.

Q. And where would that be located, Mr. Lee?

A. That would be located above a pressure surface, and supported by a pressure surface.

Q. And what does a semi-perched table consist of? Will you describe it to the court?

A. A semi-perched water table would be the surface of a zone of saturation above the pressure surface. * * * * *

A. In the case of a semi-perched water, it is not separated by a zone of—a nonsaturation zone. [6008]

* * * * *

(Testimony of Charles H. Lee.)

The Witness: Yes, your Honor.

The Court: Let us mark the photostatic excerpt then O for identification and it can then be withdrawn for completion.

Mr. McPherson: Very well, sir.

(The document referred to was marked Defendants' Exhibit O for identification.)

Mr. McPherson: These photostatic copies of excerpts consist of pages 38, 39, 40——

The Court: I thought you just described them.

Mr. McPherson: No, I did not. I didn't give the pages.

——of U. S. Geological Survey Water Supply Paper 494, dated 1923, by Oscar E. Meinzer, pages 38, 39, 40;

Pages 57, 58, 59 of "Ground Water, 1947," by E. W. Bennison;

Pages 216, 217, 222, 223, of "Hydrology, 1949," by C. O. Wisler and E. F. Brater; [6014]

And pages 466 and 467 of "Hydrology, 1949," edited by Oscar E. Meinzer. [6015]

* * * * *

Q. You used there—and I simply wish to be certain [6016] I understood you—you used the word "natural water table," and by "natural water table" do I understand you to refer to the surface of the zone of saturation? In other words, what shall we understand by your use of the term "natural water table" in that answer?

A. Natural water table as I used it there is in the sense of the water table existing in the cone of

(Testimony of Charles H. Lee.)

the San Joaquin River prior to the irrigation and maintained by the water of the San Joaquin as it seeps from its channel and enters aquifers and enters the banks of the stream and percolates outward, feeding through the aquifers of the cone and their distributaries and maintaining a water table throughout the cone. [6017]

* * * * *

Q. (By Mr. McPherson): Exhibit 73, as with all the sheets it consists of here, does in your opinion correctly reflect the slope of the ground-water table, does it not, for the years which they cover or the dates which they cover, rather?

A. As stated before, it does so in general, but locally there are areas where I do not think that it does; and it does [6209] not portray the piezometric surface, as affected by the current pumping. The exhibit shows the effect, as ultimately reflected by the water table, as a result of subdrainage. In the course of time, the effect of pumping at a lower level and the lowering of the piezometric surface, as a result thereof, will cause downward drainage of the free water immediately below the water table, so that the water table will fall and will reflect that drainage and abstraction of water passing from the free water immediately under the water table through the semi-permeable confining media.

Q. And into the aquifers below?

A. From whence it would have come into the pumped wells. [6210]

* * * * *

(Testimony of Charles H. Lee.)

The Court: The record will show I am returning Mr. Lee's personal copy of the book "Ground Water" by Tolman to Mr. Rowe and Mr. Rowe is substituting a different copy of the same edition, and the clerk will mark it in evidence.

(The document referred to was marked Plaintiffs' Exhibit No. 68 and received in evidence.)

(The document referred to was marked Defendants' Exhibit P and received in evidence.)

(The document referred to was marked Districts' Exhibit N and received in evidence.)

(The document referred to was marked California Exhibit Q and received in evidence.)

* * * * *

Q. (By Mr. McPherson): There is an overdraft on the underground water supply, is there not, Mr. Lee, in the Fresno Irrigation District?

A. There has been, in my opinion, in recent years. [6250]

* * * * *

Q. (By Mr. McPherson): Mr. Lee, assuming for the purpose of this question that the water contour map for the year 1950, Exhibit 88 in evidence, does correctly reflect the ground water table, will you indicate in the area of the cone of the San Joaquin River which has been superimposed on that exhibit the general direction in which the underground water moves? [6313]

* * * * *

The Witness: Downstream from Biola, the movement from the river, as indicated by this map, ex-

(Testimony of Charles H. Lee.)

tends out through Kerman, to which I am now pointing, and substantially to and including the edge of the cone at about the Fresno by-pass; and it also extends into the Tranquillity area beyond the by-pass. [6318]

* * * * *

EDWARD PAYSON GREGORY

called as a witness by and on behalf of the plaintiffs, being first duly sworn, was examined and testified as follows:

The Clerk: State your full name.

The Witness: Edward Payson Gregory.

* * * * *

Direct Examination

Q. (By Mr. Rowe): Mr. Gregory, you are a licensed appraiser, are you not?

A. Yes, sir. [6843]

* * * * *

Mr. McPherson: That is Exhibit A to the amended complaint, July 25, 1951, and was formerly 7-51-24, introduced at page 238 as No. 29 in this hearing.

Q. (By Mr. Rowe): Mr. Gregory, showing you Exhibit 29, did you make a survey in the summer of 1951 of the number of acres of growing crops within the dotted lines on Plaintiffs' Exhibit 29?

A. Yes, sir, I did.

Q. Could you give us the acreages of the various crops?

(Testimony of Edward Payson Gregory.)

A. Well, in cotton we had 5,381; vineyards, 3,398; alfalfa, 1,290; truck gardening, 373; sweet corn, 157; rice, 39 acres; pasture, 1,251 acres irrigated; grain, 5,715, mostly nonirrigated; natural pasture, browse brush, 5,725, barley, 685; summer fallow, 490; gravel, 174; golf course, 127; swimming pool, 18 acres; turkeys, 159 acres.

Q. And in regard——

The Court: What was that 157 following "truck gardening"?

The Witness: Sweet corn; that is also truck.

* * * * *

Q. (By Mr. Rowe): What quality of soil is it?

A. It is a very good, productive soil, for the most part.

Q. Take auger boring? A. Yes.

Q. Of the acres you have listed as browse land, what part of that acreage could be leveled or cleared and put into productive agricultural land?

A. Well, most of it could be made arable land.

Mr. Rowe: That is all. [6848]

* * * * *

Mr. Rowe: That is all, your Honor.

Depending on Government counsel—oh, there is one other thing. I ask the introduction of Plaintiffs' Exhibit for identification 31, which is the legal description of the combined land, or showing the combined exterior boundaries of Professor Smith and Mr. Lee.

The Court: Admitted.

(The document referred to, marked Plaintiffs' Exhibit No. 31, was received in evidence.)

The Court: Yesterday afternoon you offered something, and Mr. McPherson objected and said he wanted to look at it. What was that? [6849]

The Court: Let us get that one thing straightened out first.

Mr. McPherson: This exhibit that you proffered here a minute ago, we made an objection to that in the beginning.

The Court: 29? No, 29 is in evidence.

Mr. Green: 31 we are speaking of.

Mr. McPherson: There was no objection to it. I don't know why it was not admitted when it was offered.

Mr. Rowe: I missed that.

I have here an order admitting certain persons named as party plaintiffs that the court has already made an oral order on. I will serve copies on counsel.

The Court: What about the City of Fresno?

Mr. Rowe: I have a special one on that. In other words, these are as named plaintiffs and representatives of the class. I do not think the City of Fresno or Tranquillity would particularly represent the class.

Mr. McPherson: Haven't you stated yourself out of court then?

Mr. Rowe: No, they are in as named plaintiffs.

The Court: They are either in as named plaintiffs and representatives of the class or they are not in.

Mr. Rowe: Then I will add that they go in as named plaintiffs and representatives of the class.

Mr. McPherson: We will object to that. [6850]

Mr. Rowe: You have already made the order.

Mr. Green: We agree with counsel that they cannot be representatives of the class.

Mr. Rowe: I will withdraw that comment.

The Court: Withdraw what comment?

Mr. Rowe: That they cannot be.

Mr. McPherson: If they are joined as plaintiffs it would have to be over our violent and continued objection for the reason that they cannot and are not representatives of any class; on the contrary they stand in a class by themselves and their interests are obviously contrary to and adverse to Mr. Rank and all the named plaintiffs in this case as well as the class plaintiffs. Mr. Rank claims to represent.

Mr. Rowe: They were not. They were admitted as named plaintiffs on underground and percolating water. The more water that goes down the river the better for them.

The Court: Has there been a previous order?

Mr. Rowe: Yes. They were both admitted by order of the court.

The Court: Is there any objection to signing this order by the named plaintiffs?

Mr. Abercrombie: We do not have a copy of the order, your Honor.

The Court: Where is the proposed order on the City of Fresno and on Tranquillity? [6851]

Mr. McPherson: May I ask a question about this

order of counsel before it is proffered? We have just received it.

Is it true, Mr. Rowe, that these persons named in the order, the draft which you have just handed us for the court's execution today, are all of the individuals who have appeared and testified in this case and who indicated that they were willing as named plaintiffs?

Mr. Rowe: Yes, and I will give you the date if you want from the record. There were 15 or 20 others that appeared and testified and stated they would like to be represented by Mr. Rank, Mr. Cobb and the others as members of the class. These are those that actually asked to become named plaintiffs and the representative of the class.

Mr. Abercrombie: Mr. Rowe, are these parties all in the river bottoms within those dotted lines?

Mr. Rowe: No, they are on the bluff too, like Mr. Hawkins, vice president of the California Peach and Fig Growers.

Mr. McPherson: That is true of "Red" Arnold also?

Mr. Rowe: "Red" Arnold is on both.

Mr. Abercrombie: As far as the Districts that I represent are concerned, we reiterate all the objections we have heretofore made in connection with the proffer of these parties as plaintiffs in the action, and the additional objection to the execution of this order because of the manner in which the order is drawn, it assumes the existence of [6852] the class and that these parties are representing

some class, and it is our position that this is not a proper class action.

Mr. McPherson: We go further than that in our objection, assigning all of the grounds that were assigned to the testimony, and request of each of these people to join those that have been named by Mr. Abercrombie and in addition the record in this case shows by the testimony of Arnold and Hawkins and others that they do occupy an inconsistent and contrary position to the members of the class as described in the complaint and that they could not represent them as a class. Mr. Arnold, for instance, claims both a prescriptive right and a riparian right, and they are antagonistic.

Mr. Child: We join in both the objections of Mr. McPherson and Mr. Abercrombie.

The Court: It is novel to me that people cannot be members of the same class with respect to one thing and not have adverse interests concerning another thing. I have already discussed fully and have written an opinion on the question of class actions and decided on it, and that is the law of the case. I will adhere to it.

I do not have any record reference and unless there is some objection I am willing to take Mr. Rowe's word that these are the ones who indicated that they desired to appear as parties. [6853]

Mr. Rowe: I will give you the page number if you want it.

The Court: I want to state to you that I do not know what disposition I might ultimately make con-

cerning the others who stated they desired to join in a class but not as parties.

Mr. McPherson: He doesn't need the page reference, your Honor. If Mr. Rowe makes the statement on his professional responsibility that these are all that are joined, we will accept that. If there are any mistakes I know he and the court both will correct it.

The Court: This order is signed on the individuals.

Where is your proposed order on Fresno and Tranquillity?

Mr. Rowe: I regret, just being one counsel, I came over without that folder this morning, but I will have it over here within 10 minutes or before this is closed. The City of Fresno order and the Tranquillity has already been made admitting them.

The Court: I think that could be deferred until we meet again. You can make your objections at that time. It will be presented then.

Mr. Rowe: I wish to amend paragraph III, submit an amendment, whichever way counsel feel that any decree in this case might protect the Government either on the basis of a combined percolating area, Lee and Smith combined, or Mr. Lee's. [6854]

Personally I am going to offer an amendment to the complaint, paragraph III, setting forth Mr. Lee's description of the alluvial cone, but if it would aid counsel I will change that and put in the combined description.

The Court: One of the issues here is the extent of the members of the class. He has put on Mr.

Smith's testimony and Mr. Lee's testimony, and I think under the present trial order there would have to be an order of court, and especially under the rules, as to who is or who is not included in the class. I do not think that you can amend out many thousands of acres of land which are included within Smith's line but not within Lee's line, until there is an adjudication as to one or the other.

Mr. McPherson: That would certainly seem to be the correct rule, assuming the court was correct in your order that it was a true class action.

The Court: Yes, that is correct.

Here is this exhibit for identification. Was it marked?

The Clerk: Yes, I put it on here.

The Court: Exhibit Q.

You were going to get a copy of this? Is there any objection to giving this book to Mr. Lee now?

Mr. McPherson: Not at all. We are having it reproduced.

The Court: Here it is, Mr. Lee. Exhibit Q is withdrawn. You will make a note and a minute order, Mr. Clerk, [6855] that it be substituted by a photostatic copy supplied by the defendants.

Mr. McPherson: I don't know whether it is photostated or not.

The Court: Well, some kind of a copy.

Mr. McPherson: It will be a reproduction.

Mr. Rowe: I offer this as an amendment, the combined legal description——

Mr. McPherson: May we have a copy of it?

The Court: I think he will have to give notice

to the defendants and set it down for hearing. You can set it down for hearing on next session of court.

Mr. Rowe: Do the defendants want me to go through that procedure?

Mr. McPherson: Let's see what you have.

The Court: I will give this back to you. You serve them and file it and notice it and I will set it down for hearing now.

Mr. Rowe: There is no use taking more time if there is no objection. I think it would be to counsel's benefit to get as big an area in as possible. Then the court could make a determination of a lesser area, if any.

The Court: Is that not covered by the pretrial order?

Mr. Rowe: I can ask for an amendment to conform to the proof without serving notice, and I think it is covered [6856] by the pretrial order. That was what the court ordered, the exterior boundaries of both.

Mr. Child: Then there is no need for this.

Mr. Rowe: This is the amendment in accordance with the pretrial order.

The Court: Suppose that you serve it on counsel, give them copies of it, and when we resume again I will rule on the matter.

Mr. Rowe: I ask if they have any objection.

The Court: They have to look at it first.

What else?

Mr. Rowe: That is all at this time.

The Court: You mean the plaintiffs rest?

Mr. Rowe: At this time.

Mr. McPherson: No.

Mr. Child: No.

Mr. Rowe: The plaintiffs rest.

Mr. Child: You have rested now, period.

The Court: This is subject to the agreement you made with Mr. McPherson that a witness whose name I have forgotten—what was it?

Mr. McPherson: Dawson.

The Court: ——Dawson, who appeared here and testied, when he is available, which I understand he will be available probably in September or October, may be cross-examined [6857]by Mr. McPherson as a part of the plaintiffs' case. In other words, his examination of Dawson will be the cross examination of the plaintiffs' direct examination.

Is that correct, Mr. McPherson?

Mr. McPherson: Yes.

Mr. Rowe: Also subject to viewing the collapsible gates on July 8th.

The Court: And your aquifers.

Mr. Rowe: And also subject to the court's free ability to roam the aquifers.

The Court: No, it is not necessary for you to comply with the request I made at all. It is your lawsuit and I do not care. I suggested that you have Mr. Lee pick out places where the court could see what he has described as acquifers, or typical, or something. If I go to see them I intend and propose that counsel shall go along, the reporter shall be there, and Mr. Lee shall be there, and counsel have an opportunity to see what he shows me, what I see, and cross-examine him about it. [6858]

* * * * *

Mr. McPherson: Now, as has been indicated previously, it is our purpose, or was our purpose at the time we started our preparation for this trial, to have the State's case made complete before the defendant officials of the Bureau of Reclamation case was offered because of then inability, because of his being called back into the Army, of the geologist who did the original work for the State to appear, and it was agreed between Mr. Shaw and myself in order that the hydrologist and other experts who would testify for the State might have a predicate in the record for portions of their testimony at least, that we would offer out of order and as a preliminary to the State's case the testimony of Dr. William I. Gardner, a geologist of the Bureau of Reclamation, in [6942] connection with whose testimony we would proceed to geologize the entire area both for ourselves—for our case, I mean— as well as for the case of the State of California and in that manner to make available to the State a number of exhibits which have been prepared by the Bureau of Reclamation officials under Dr. Gardner's direction.

Our purpose in doing this was twofold: (1) to prevent duplication in the record of geological testimony, and (2) primarily to avoid the necessity of duplicating the preparation of exhibits which will be used by all of the witnesses. It has, I think, some virtue and I ask the court's indulgence for that purpose.

The Court: There can be no objection to that.

Mr. Rowe: No objection.

Mr. McPherson: Mr. Gardner.

WILLIAM I. GARDNER

called as a witness by and on behalf of all defendants, was examined and testified as follows:

The Clerk: Will you state your full name.

The Witness: William I. Garner. [6943]

* * * * *

The Court: You have none in the fan?

The Witness: We have none now in the areas designated by Mr. Lee as the fan or the cone of the San Joaquin River.

The Court: The Kings?

The Witness: No, sir. [6955]

* * * * *

Starting at the north is outlined the watershed in the Sierra Nevada for the Fresno River drainage basin.

Next to it, or east of it, is that of the San Joaquin River drainage basin.

South of the San Joaquin River basin is the Kings River drainage basin.

And then, most southerly of the ones we have outlined, is the Kaweah River drainage basin.

You will note that the crest of the Sierra Nevada is indicated by a line on the map which starts in the lower right portion of the map and runs in a generally northwesterly direction to the top of the map, just west of Mono Lake.

The drainage basin, then, of the San Joaquin River extends easterly to the crest line of the Sierra Nevada; and likewise the Kings River drainage basin extends eastward to the crest line of the Sierra

(Testimony of William I. Gardner.)

Nevada. So that these two streams pick up all of the precipitation falling in the Sierra Nevada west of the crest.

The Fresno River drainage basin, however, only runs back about half the distance to the crest, and it has a relatively small area there; and the Kaweah River also runs back——

The Court: There is a crest between it and the north fork of the Kern, is that it?

The Witness: Yes, sir. You are speaking of the Kaweah? [7008]

The Court: The Kaweah, yes.

The Witness: Yes. Now, the San Joaquin River —Millerton Lake, at Friant, is indicated here by "Millerton Lake," and the town of Friant is shown, and the river then flows southwesterly to a point near Pinedale, then generally westerly to the trough of the valley, then northerly.

The Kings River, from a point near Delpiedra, flows in a generally southwesterly direction. It comes out onto the valley floor, where it tends to break up into a number of channels which are reunited, and then flows in a generally westerly direction out into the trough of the valley.

The valley has been filled by alluvium carried down by the streams in the Sierra Nevada and deposited on the floor of the valley. It has also been filled to some extent by streams draining the Coast Range and flowing in a generally easterly or northeasterly direction into the valley. However, by far the greater part of the precipitation and the run-

(Testimony of William I. Gardner.)

off in the San Joaquin Valley has its source in the Sierra Nevada. Consequently, most of the material which is filling the San Joaquin Valley has had its source from the Sierra Nevada; and that is illustrated by the location of the trough of the valley, the trough of the valley being shown by these numerous blue lines and swamp symbols running northwesterly and lying very close to the Coast Range, as compared to the distance out from the Sierra Nevada. [7009]

In other words, most of the material that is being brought down by these streams is carried out into the valley, and so the alluvial plains are formed by the Sierra Nevada streams to a much greater extent than the alluvial fans or plains being built up by the Coast Range streams.

Now, the two main rivers in this entire area are these two streams, the San Joaquin and the Kings Rivers. The Kaweah is a small stream. South of it is the Tule, and other small streams. So that the greater part of the material which is brought into the valley in this whole area must be derived from the Kings River and the San Joaquin River drainage basins. And we can see how these streams have carried the material far out here (indicating), so that they have filled all this area in here west—or east of the cros line, with a material which is derived predominantly from the San Joaquin River and the Kings River basins. [7010]

The Court: And further illustrated by the fact that Buena Vista Lake is almost on the west edge of the Coast Range, whereas the water you included

(Testimony of William I. Gardner.)

comes from the Sierra Nevada and likewise Tulare Lake?"

The Witness: Yes, sir. This Buena Vista Lake, that water is derived from the Kern River which has built a large fan in this area.

Now these two streams then have had the major job of building the alluvial fill in the valley in this area and it has been impossibly, or it would be impossible, for the other streams to keep up with it if they did not occasionally receive some help. So that this material then has been spread around in a considerable area from the points where the San Joaquin River and the Kings River issue from the mountains.

I want to point out here at Sanger the Kings River swings from its southwesterly direction to a southeasterly direction and then flows westerly down the fan to the trough of the valley, and that is an illustration as to how these channels do not flow directly down this cone but they tend to swing back and forth across the fan at the time that they are building it up.

In the same way there has been no doubt but that at s e time in the past the Kings River has swung n rth and would have gone down through Fresno to the trough of the valley.

In the same way the San Joaquin River, which is now [7011] flowing southeasterly to a point near Pinedale and then swings in a general westerly course——

Mr. McPherson: You mean southwesterly?

(Testimony of William I. Gardner.)

The Witness: Southwesterly; yes—has changed its position on the fan so that instead of moving or flowing in a southwesterly direction from Friant to Pinedale in the general vicinity of Friant or downstream from it a few miles it could swing westerly and go in a course which would take it closer to Madera simply because the Fresno River is incompetent to bring in enough material to keep up with the San Joaquin River.

The Court: Might it also not have flowed on due south?

The Witness: From here?

The Court: Yes.

The Witness: It is possible, yes, that the San Joaquin River at some other stage when the Kings River might have been flowing further south than it is at the present time could have flowed in a more southerly direction coming closer to the city of Fresno.

The Court: Might it have emptied at one time into the basin of what is now Tulare Lake or the remnants of it?

The Witness: I do not believe it would have emptied into a lake.

The Court: It would have been a much larger one that would have extended perhaps as far north as the blue line? [7012]

The Witness: Well, at one time there was a lake which extended far to the northwest of the Fresno River, but that was many years ago and the deposits which were laid down in that lake are not

(Testimony of William I. Gardner.)

exposed on the surface so far as we know in the valley. As a matter of fact, they are found at depths of five or six hundred feet below the surface, so that at that stage anyway there was a lake which occupied largely what is now the western part of the valley and came up to the trough.

Our subsurface work, however, shows that that lake ended down in the general area of Gravelly Ford so that there is no evidence of there ever having been a large lake which would have received deposits in the area of Fresno and Madera on the more easterly parts of the plains.

The Court: In other words, the evidence shows there have been too a large lake in the southern portion of the valley probably ending across from the tip of the Fresno River drainage basin which projects further into the valley than any other projection of the Sierra Nevada up to that point.

The Witness: There has been some movement since these deposits in the lake were laid down because they do show some faulting and they show a trend that carries them into the Coast Range so that when that lake was in existence the valley was not entirely as we see it now. Th Sierra Nevada [7013] were in existence, the Coas Range were similar, and there were hills in that area but they were not probably as high as they are at the present time because there has been some movement since.

The Court: The Coast Range is geologically newer than the Sierra Nevada?

(Testimony of William I. Gardner.)

The Witness: Yes, sir.

The Court: And is rising?

The Witness: It is undergoing disturbances. Whether or not it is rising, we don't know. There is warping going on. It is going up in some places and probably down in other places. And the movement as shown along the San Andreas Fault is a horizontal movement predominantly rather than an uplift.

Q. (By Mr. McPherson): Can you from that map tell us whether there is any fan or cone—and, by the way, before we get any further, you have used that word apparently interchangeably with cone. Do you mean to distinguish between a fan so-called and an alluvial cone so-called, and if there be a distinction what is it?

A. I would not call these deposits in the area of the Kings and San Joaquin and Fresno Rivers cones. The concept of a cone calls for much steeper slopes on the surface than we find on the valley floor here. [7014]

Now this area has been referred to in the old publications as the Fresno Plains, and I think that that is as good a term as any to use in referring to this entire area.

When you speak of a cone it too calls for more individuality than we find here. A cone is distinct and separate, it is an individual in general, as compared with a fan or a plain.

Now cones are deposited in areas where you have a steep mountain front and torrential streams drain-

(Testimony of William I. Gardner.)

ing this steep mountain area and then suddenly the stream issues out into a valley. There is almost an immediate change in the grade of the stream and consequently a change in the velocity of the water. When the stream issues from the mountains it isn't confined in a narrow canyon that tends to be in the mountain but it comes out into the valley and the grade is not only reduced but it also can spread more laterally.

Now under those conditions, with a steep gradient and confined canyons in the mountain areas and torrential flow streams have a great transport power so that in flood times they bring down a tremendous amount of material and that material then tends to be dropped quite suddenly in the valley area so that a cone is built up with a very steep surface slope probably exceeding 300 feet to the mile.

The Court: Probably exceeding 300 feet?

The Witness: Yes, exceeding 300 feet to the mile. [7015]

Now these individual streams then like I say tend to build their own cones under those conditions.

Q. (By Mr. McPherson): Now a fan, how do you distinguish a fan and how is it built?

A. A fan tends to lose its individuality. It is deposited by a stream which has more uniform flow than the torrential streams. The torrential streams will have a very quick runoff, a flash flood or something of the sort, although it may be a permanently flowing stream, but there are these great variations in the flow and the tremendous variations in the

(Testimony of William I. Gardner.)

transporting power of the stream; whereas a fan is built up by a stream under which there is more continuous period of sedimentation, there is more sorting going on and wider distribution of the sediments, the gradient is much less and to distinguish it again from a cone you may not be able to see that there is such a thing as an alluvial fan when you see it on the surface because the gradients are low and the topographic changes are not apparent to the eye. It requires a topographic map to develop the fan, that there may be an alluvial fan in the area.

Q. (By Mr. McPherson): I understood you a moment ago, Mr. Gardner, to say that in your opinion the Kings River at one time turned westerly at Sanger and ran through what is now the city of [7016] Fresno. Did I correctly understand you?

A. Yes, sir, I believe that the Kings River has flowed westerly into the vicinity of Fresno.

Q. Do you have an opinion as to whether or not the Kings River ever joined the San Joaquin River at a point more easterly than that at which it now joins it?

A. It is possible that the Kings River could have joined the San Joaquin at a point east of the present trough. However, I believe that the trough is fairly well defined under the present climatic and topographic conditions in the Coast Range and Sierra Nevada.

Q. Do you have an opinion as to whether or not the San Joaquin River ever at any time ran through what is now the city of Fresno?

(Testimony of William I. Gardner.)

A. I do. Considering the location of Fresno with respect to the Kings River and the point at which the Kings River issues from the mountains and the point at which the San Joaquin River issues from the mountains, I believe that although the San Joaquin River has flown in a channel more southerly than the present one, that the chances for it to have reached Fresno are much less than for the Kings River to have gone through Fresno.

Q. Upon what do you base the opinion that the Kings River formerly ran through what is now the city of Fresno, whereas the San Joaquin River in your opinion did not? [7017]

A. It is based again upon the location of the streams and the surface topography and upon the character of some of the alluvial deposits we find in the trough of the valley. [7018]

* * * * *

Q. (By Mr. McPherson): When you say "in this position" you mean westerly through the city of Fresno?

A. Westerly through the city of Fresno.

It would then be in a position where it would deposit material so as to fill up this trough such as shown in the city of Fresno, and we would then find that the San Joaquin River sediments in here are overlapped by Kings River sediments. And that is an illustration of how the major overlapping or the merging of the sediments brought down by the two streams in building up this great alluvial fill in the valley occurred.

(Testimony of William I. Gardner.)

The Court: Or has has been described as interfingering?

The Witness: It is more than that. By interfingering you get the idea that there is a narrow channel coming down and being buried under some of these other deposits. It is more widespread than that. It is actually interleafing. It would mean that this whole area here, which would have been San Joaquin River sediments, would be buried under Kings River sediments, so that the two fans have actually merged together.

Now that illustrates any study made by using the topography and determining the possible source or channels and courses of the Kings River. [7027]

In regard to the San Joaquin, we find that west of Friant in the vicinity of the area of Little Table Mountain, which is about three miles west of Friant, there is a low range of hills there which have been broken through and there is a fairly wide valley extending up through this range of hills and toward Friant. And south of this range of hills there is a channel now followed by Route Creek. At some time the San Joaquin River has undoubtedly carved out this gap in the hills south of Little Table Mountain, and it would then have flowed westerly toward, or between its present course and the town of Madera.

At another time at a relatively late stage undoubtedly it flowed down what is now the course of Route Creek. So that this area through here, even

(Testimony of William I. Gardner.)

through the Madera area, would contain San Joaquin River deposits at that depth.

Now, then, at this particular stage the San Joaquin River is not contributing to the alluvial fill of course around Madera and as a consequence we see a small fan being constructed by the Fresno River, it being shown by this westerly bulge in the 250 foot contour line west of Madera.

Now that bulge there is so small during the time that has been available for the Fresno River to bring down material and build up a fan that it indicates the amount of help which must have been given to this area by the San Joaquin River in filling the valley. [7028]

* * * * *

Q. (By Mr. McPherson): Do you have an opinion, sir, as to when the San Joaquin River commenced the entrenchment along the present channel?

A. We haven't attempted to estimate that in years. It is in late geologic times, and to date it in years would be impossible.

We can date it as being late in the Pleistocene period, which was the period generally known as the Ice Age; and I have an opinion that it probably did begin when there was a climatic change and a reduction in the amount of debris which the streams were carrying from the Sierra Nevada out into the valley; that probably during the melting of the ice—you know there were these enormous glaciers and ice fields on the upper part of the Sierra Nevada—

(Testimony of William I. Gardner.)

that during that last period of melting, the streams would bring down a very heavy load of material from the mountains, and when the streams issued upon the valley floor, the debris would be deposited.

Then there was this climatic change, and the amount of water which was available to the streams was decreased, and that would just decrease the amount of material which the streams would carry from the mountains, and it would increase the erosive power of the streams when they came out upon the sediments in the valley fill. And so the San Joaquin River began its entrenching at that time. [7033]

And as to why there is this difference between the Kings and the San Joaquin River, in the amount of entrenching, that, too, is open to argument, but there is a decided difference in the gradient of the two streams. The Kings River is not a well-graded stream, as we would call it; there is a hump in it here (indicating), and it may be due to crustal movements which affected this area and which did not——

Q. What do you mean by that, "crustal movements"?

A. Well, it would be a warping of the formations making up the rocks in that particular area, a folding or tilting of the rocks. So that the Kings River is not a well-graded stream, as compared with the San Joaquin River.

Q. You stated in your testimony that, in your opinion, from reading those contours, the fans of

(Testimony of William I. Gardner.)

the San Joaquin and Kings Rivers merged or overlapped in the nature of an interleaving. Can you mark on the map the most easterly point where the overlapping or interleaving occurred?

Mr. Rowe: I am going to object on the ground he hasn't given a sufficient basis for any such conclusion. All he said was that he flew down in a couple of commercial airliners, and he has a couple of 25-foot contour maps with 25-foot contours.

The Court: That goes to the weight of the evidence, not its admissibility.

Mr. Rowe: He has to have some sort of basis for the [7034] statement. He can't pick it out of clear air. He doesn't show the watershed of Dry Creek, or what the flow of Little Dry Creek or Red Bank or the rest of them is.

The Court: That goes to the weight of the testimony. He said he made the trips, and studied the map, and other things.

The Witness: I would say that the Kings River flowed directly west and through the City of Fresno.

The Court: He wanted you to mark on the map the most easterly point of overlap of the fans——

Mr. McPherson: Of the fans of the two rivers.

The Court: ——of the San Joaquin and Kings Rivers.

Mr. McPherson: Yes, your Honor.

The Witness: That would take in the subsurface information.

Mr. McPherson: We are going into that later, and I will come back to that.

(Testimony of William I. Gardner.)

The Court: Is there any other river that flows east and west from the Sierra Nevada, south of the Mokelumne, on the east side——

The Witness: I will have to look at the general map to answer that.

Q. (By Mr. McPherson): Do you want that S back on the board? A. Yes. [7035]

The Court: You can skip that until later on, if you wish.

Mr. McPherson: We will come back to that.

The Court: If I understand you correctly, the area overlapped between the two cones, that is, between the cones of the two rivers, is shown on the north there, between the Fresno River and the San Joaquin River, by the trough which is the low portion of the line, about midway.

The Witness: Here (indicating).

The Court: Right there, the trough line along toward the mountains and southwesterly.

The Witness: Yes. That is approximately two miles south of the City of Madera.

The Court: That trough then would extend over on the 200 contour a little south of where you had your point, and go northeasterly, wouldn't it?

The Witness: It would go almost—a little northeast.

The Court: Yes.

The Witness: Then we get to this contour (indicating).

Q. (By Mr. McPherson): By "this contour" you mean what?

(Testimony of William I. Gardner.)

A. The 275 contour, which is 25 feet higher than the 250 of which we have been speaking, in this area (indicating).

Q. By "this area" you mean what? You have to identify it or the evidence will be meaningless.

A. Southeast of Madera. [7036]

Q. And along what contour?

A. Along the 275 foot contour. It is modified by Cottonwood Creek which is flowing southwesterly and crosses the 275 foot contour approximately three miles southeast of Madera, so that here in the 275, where it is crossed by Cottonwood Creek, you then have the small fan being built up by Cottonwood Creek.

The Court: So that the line would go along as you extended it and then it would go almost due east?

The Witness: Due east along——

The Court: To where that other sawtooth 275 foot contour is north of Route Creek, in that general direction. In other words, that would be the trough which would be the extent of the overlap between the Fresno River and the San Joaquin River.

The Witness: That marks the overlap of the fan of the Fresno and Cottonwood Creek onto the surface of the San Joaquin River fan.

The Court: And likewise—pardon me.

The Witness: But the San Joaquin River alluvial deposits would extend underneath that surface covering which has been brought down by the Fresno River and Cottonwood Creek.

(Testimony of William I. Gardner.)

The Court: Now between the Kings and the San Joaquin, that low or trough which is shown by the bend of the contour lines toward the upper right-hand corner of the map to the [7037] northwest, would likewise be the place of overlap between the Kings fan and the San Joaquin River fan?

The Witness: Of the surface deposits.

The Court: In what you call the later cone or later fan?

The Witness: The very last stage; yes, sir.

* * * * *

Q. (By Mr. McPherson): So that we will be able to follow you accurately and know what you are referring to later on in your testimony, will you define or give the distinction you mean to imply by the use of the words "dip" and "tilt"?

A. The term "tilt" we use to indicate that a block of the earth's crust has been uplifted on one side or lowered on the opposite side, so as to give an inclination.

The Court: Or a dip?

The Witness: Or a dip. We use the word "dip" loosely in this connection, because "dip" has another, more technical meaning, which would be the direction of greatest inclination of the bed or the formation, and it would be the angle in the direction of the greatest inclination of the formation.

Q. (By Mr. McPherson): So when you use the word "dip" in your geological explanation here, you mean it to encompass the latter explanation which you have just given? A. That is correct.

(Testimony of William I. Gardner.)

The Court: That is to say, the direction of the inclination and the amount of inclination?

The Witness: When I said "dip to the southwest," I was indicating that the surface of the basement complex rocks was inclined toward the southwest. As I said—— [7083]

* * * * *

So that we do have—there would be a bed, oh, as I recall it, roughly, four or five hundred feet in this area close to the foothills and south of Friant and becoming progressively——

The Court: Of marine deposits?

The Witness: Yes.

The Court: Yes.

Q. (By Mr. McPherson): Becoming progressively what?

A. Deeper, then, toward the trough of the valley. So that if we went down—say we had a shaft in the valley area, well, say in the vicinity of Herndon, we would go down through several hundred feet of alluvium, which comprises the ground-water basin, and if we continued going on deeper we would enter these older formations, the marine formations, which are entirely outside the ground-water basin. They have been cemented, pore spaces have been filled, or if there are pore spaces in those old formations that are filled with water, the water would be so saline as to be unusable for domestic purposes. [7169]

* * * * *

(Testimony of William I. Gardner.)

The Court: Well, now, then generally in the vicinity of Herndon the valleys were filled up with deposits alluvial in character but deposited in still water such as the marine deposits?

The Witness: That is correct; yes.

The Court: And that above that, that would be alluvial deposits?

The Witness: Yes, sir.

* * * * *

The Court: It is stated in one of the other geological [7171] works, I believe in Report No. 11 or No. 25—I have forgotten which—that at one time this was all an arm of the sea.

Mr. Rowe: When you say "this" could the court give a little better description?

The Court: That is, the San Joaquin Valley.

* * * * *

The Court: Yes. In other words, that portion of the valley, or some, or all of it was an arm of the sea? [7172]

The Witness: That is correct.

To go back to those times, the Coast Range was not in existence, such as we know it now. It was a series of islands, an archipelago, and there were embayments of the ocean that extended through what are now the Coast Range and into the San Joaquin Valley and particularly into the southern half of the San Joaquin Valley. * * * * * [7173]

Mr. Rowe: At what age was the sea supposed to have been here?

The Court: What age was the sea here?

(Testimony of William I. Gardner.)

Mr. Rowe: At Herndon or at Fresno?

The Witness: There is the Tulare formation which extends in age from upper Pliocene into the Pleistocene period, and the lower part of the Tulare formation contains marine deposits. That would be the youngest marine deposit that I know of in the valley. [7174]

* * * * *

The Witness: The Friant formation is approximately 150 feet—from 150 to 200 in thickness.

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The Witness: The marine beds which I referred to as underlying the alluvial deposits in the valley were not considered a part of the basement complex.

* * * * *

A. I was checking with regard to Lee's well No. 165. I was checking the log against our graph of the log on cross-section A-A primed, Exhibit Y-1, and this log as given in Exhibit 54 is the same as the one that we used, your Honor.

The Court: Very well.

The Witness: That is the list.

The Court: Yes. In other words, you assumed the log as set forth in Exhibit 54 for well 165 to be true and correct?

The Witness: Yes. We took that log and used it on this exhibit.

The Court: Very well.

Mr. McPherson: Perhaps it would put counsel and the court at ease somewhat if we informed you at this time that it is my purpose to have the wit-

(Testimony of William I. Gardner.)

ness read and interpret the well logs shown on Exhibit Y-1, and possibly one of the other sections—I am certain one of the other sections—and we will then simply group those in the other exhibits [7222] and he will not continue to read them all through.

I think, however, in order that you might better understand the exhibit and the interpretation that we put on the section and the well logs and their effect upon the geological conclusions to be reached in this case, that it is essential that he read one of the sections completely.

The Court: Very well. [7223]

The Witness: I had read the group of wells on the left, up to Lee's 165.

As Lee's Well 165 is plotted here on the profile, it is about 94 feet deep. The top portion contains 15 feet of soil — of material which is logged by the driller as "soil" — and the remaining portion is logged as clay, sand, clay, sand, clay, sand, clay and sand.

The next well——

Q. (By Mr. McPherson): Before we leave that well, you told us it was approximately 94 feet deep. How far is it from the river?

For convenience, we will use the river measured from the location of Well 12-20-16, which you have shown in the bottom.

A. Yes, sir. As measured from approximately the center of the graph illustrating Well 12-20-16 to the center of the graph for the Lee 165, it is 4.8 miles along the line of the section.

(Testimony of William I. Gardner.)

The Court: In other words, about the closest point to the river is four miles?

The Witness: Yes, sir.

Q. (By Mr. McPherson): How far is it from Well 12-20-25 and Lee Well 165?

A. From the center of this graph, 12-20-25 to the center line—by "center" I mean a center line, vertical center line, running through the graph—it would be 2.2 miles. [7224]

To compare it with the bottom lands, we go to the left end of the profile where the San Joaquin River bottom lands are shown, and extend a horizontal line or a line which would be perpendicular to the scale shown in the left, marked "Elevation above sea level." We would run the line perpendicular to that vertical scale line, which would represent a horizontal line, run it out to the bottom lands of the San Joaquin River, and then, measuring from the 250-foot bar up to that line I just drew, give an elevation of 268.

The Court: For the bottom?

The Witness: For the bottom lands of the river.

The Court: Oh, I thought he asked you the elevation of the bottom of Lee's well.

The Witness: Yes. I will have to give that, by drawing a line perpendicular to the "Elevation above sea level" bar. I will draw one from the 250-foot elevation, and, measuring from that line which I just drew to the bottom of Lee 165, I find that its elevation—the bottom of the well is elevation 262.

(Testimony of William I. Gardner.)

Mr. Rowe: I understood the witness that the top of the bottom land shown there is only 268. Maybe I didn't hear it correctly.

The Court: I understood it that the bottom of Well 12-20-16 was 268.

The Witness: No, the bottom of Well 12-20-16—I was [7225] referring to the bottom——

The Court: Of the river?

The Witness: ——as shown, where we have the San Joaquin River.

The Court: The bottom of the river?

The Witness: That would be the bottom lands, yes.

The Court: Bottom lands, or bottom of the river?

The Witness: It would be the bottom lands.

The Court: Where the well begins?

The Witness: No, the well is at a higher elevation. The top of Well 12-20-16 is approximately elevation 300; and the bottom of Well 12-20-16 is about elevation 254.

The Court: Well, what is the bottom of the river there?

The Witness: Well, we don't actually—you mean the bed of the river itself?

The Court: The bed of the river. You have it here.

The Witness: That is the bottom land of the river. You see, the distance across——

The Court: You don't have the bed of the river?

The Witness: No, we don't have the actual——

(Testimony of William I. Gardner.)

The Court: Don't show the elevation of the bed of the river?

The Witness: Not the actual bed of the river, no, your Honor.

The horizontal distance between the bluff line on the [7226] left, which would be the north bluff line, and the bluff line on the south, or the right side as shown on the drawing, and above the small terrace on which Well 12-20-16 is located, that is a mile across there.

The Court: I see.

The Witness: See, this vertical scale is greatly exaggerated. [7227]

Mr. Rowe: I am not trying to interrupt, but I thought this was drawn to scale.

Mr. McPherson: It is. The witness just said the scale was exaggerated.

The Court: That the bottom of the river is not shown. What is the bottom of this line that you call the San Joaquin River? As I understand, A is across the river and on top of the bluff, the top line there.

The Witness: Yes.

The Court: So you just omit the river?

The Witness: The actual position of the river in the bottom lands is not indicated here. This represents the elevation of what we have been terming the bottom lands between the bluffs, and the elevations are selected or are determined from the USGS topographic maps.

The Court: This line across the bottom where

(Testimony of William I. Gardner.)

you have San Joaquin River, that is the elevation of the river banks then, is that it, which would be the elevation of the river bottom lands?

The Witness: The bottom lands.

The Court: Adjacent to the river?

The Witness: Adjacent to the river, and it would take in part of the unexposed bed of the river at the time when the maps were being made and show the sandbars, and so forth, in the river and would not show the bed of the river or the [7228] sand which would be under the water-filled channel at the time.

Q. (By Mr. McPherson): Let us go along and read it as rapidly as we can, please, sir?

A. We then move to Well 13/21-5M1, which is a log obtained from the State Division of Water Resources, and aside from the top layer classified as soil by the driller we find that it contains clay, sand, clay, sand, clay and sand.

The Court: That is in Section 5, then, is it not?

The Witness: Yes, that would be in Section 5, Township 13, Range 21.

The Court: And approximately how far from the line of Section A-A primed?

Mr. Rowe: If the court please, not to interrupt, but we are not giving a lecture before some mentally deficient institution. Can't we determine from the symbols over there, isn't it easy to determine, without taking each log and say where it is yellow it is sand, where it has that symbol it is so-and-so? The court can see that from the exhibit; if they

(Testimony of William I. Gardner.)

want to do it, I guess there is nothing I can say, but I think it is obvious.

The Court: Well, Mr. McPherson desired it and he has a right to do it, to have him explain on each one of these logs. If he does not desire it, that is something else. [7229]

Mr. McPherson: I think it is essential that we read one of them, this one and one other which proceeds down and includes certain of the wells in the trough of the valley and then our reason for doing it will become quite apparent and I think it will be thoroughly justified.

This witness is going to express a conclusion that we think the court will be tremendously interested in, based upon the irregular contours of several deposits reflected with this graph in the location and along the directions that they proceed and throughout the area with which we are concerned.

In order that this predicate for that will be apparent in the record, I think it is essential that he read it as he understands it to be.

The Court: Proceed.

The Witness: To compare 13/21-5M1 with the next one to the right we particularly — well, we will take the upper part where there is the clay, the top clay shown in 13/21-5M1, and if we would extend that horizontally to the left it might match up with the clay in 13/21-6R1.

We come down to the sand, 13/21-5M1, and we find that it does not match up with the clay or with the log to the right or to the left.

(Testimony of William I. Gardner.)

Q. (By Mr. McPherson): How far apart are those wells, Mr. Gardner? [7230]

A. I do not have the actual distances on the ground. These wells have been projected to the line of the section and they have been projected along a line which is perpendicular to the line of the section.

Mr. Rowe: I want to move to strike that on the ground that it is incompetent, irrelevant and immaterial. If we are going to show that the San Joaquin River apparently can flow into Clovis, I don't see where that is material in this case.

The Court: Overruled.

The Witness: We then come down to the second sand in 13/21-5M1 and if we compare it with the well to the left we find there is clay in that well at that same elevation.

The Court: Not entirely.

The Witness: Well, I mean at the same elevation.

The Court: Well, there is a sand in Lee 165 right in the middle, is there not?

The Witness: It is at a higher elevation.

The Court: Right in the middle.

The Witness: I was speaking of the top of that sand.

The Court: Maybe I do not understand you.

This is the top of the sand in 13/21-5M1, is it not?

The Witness: Yes, sir.

The Court: This is the bottom?

(Testimony of William I. Gardner.)

The Witness: Yes.

The Court: Is that right? [7231]

The Witness: Yes.

The Court: Here is the sand strata right in the middle.

The Witness: I was explaining about the top of the second sand in Well 13/21-5M1.

The Court: The top shows that?

The Witness: Yes.

The Court: But I understood you to say the whole strata there shows that there was clay in the other well.

Very well. I understand now.

The Witness: Comparing the second sand in 13/21-5M1 with the material at comparable elevations in Lee 165, we find at the top of that particular portion or section, the top in Lee 165 is clay which would map up against sand in the well to the right.

The central part of the section in Lee 165 does have sand in it which might match with the sand in the well to the right.

Then we come down to the bottom of this particular——

Mr. Rowe: I want to move that that last answer be stricken, and I am going to put my objection and motion on the ground that any sand, any comparison above the water level in the river, certainly is immaterial. Why go above the water level in the river if you are going to show it doesn't go from

(Testimony of William I. Gardner.)

the river out and then discuss what is up above the water level? [7232]

The Court: I think it is material.

Mr. Rowe: We might have a witness as Mr. Abercrombie says that demonstrates it runs uphill.

The Court: Your witness certainly covered that and demonstrates, and attempted to demonstrate, that water from the San Joaquin River was found in sands above the level of the river due to pressure.

Mr. Child: Certainly.

Mr. Rowe: My witness——

The Court: Let us proceed.

The Witness: I think I have gotton down toward——

Q. (By Mr. McPherson): To the bottom sand in 165.

A. I will take the middle sand. I mentioned the middle sand in Lee 165. That would be the third sand shown from the top. It might possibly match with the second sand in the well to the right, which is 13/21-5M1.

If we continue on further to the right, to Well 13/21-6R1 we find at that same elevation there is clay which would not match up with the sand in 13/21-5M1.

Going on down to the lower third of this second sand in 13/21-5M1 we find that there is clay in Lee 165, there is sand, a thin sand, at the very bottom of this particular section in Well 13/21-6R1, and then a band or clay zone above that thin sand which would not match up with the sand in [7233] 13/21-

(Testimony of William I. Gardner.)

5M1, which illustrates the lack of continuity of the beds in this section. [7234]

The Court: Let's see, I think Mr. Lee placed Well 165, and all the wells that you have on here, outside of what he called the Ancient alluvial cone of the San Joaquin River, and uninfluenced and not contributed to by the waters of the San Joaquin.

The Witness: That would be his conclusion, if Lee 165 is outside of Lee's cone.

The Court: As shown by his testimony.

The Witness: Yes.

However, if we go inside the cone as designated by Mr. Lee, taking the group of three wells in the vicinity of the location as shown on the profile here as the Enterprise Canal, we find that the Well 12-20-26A has sand and gravel under approximately six feet of soil. Below that six feet of soil there is sand and gravel to a depth of 114 feet, which is approximately elevation 250, and below the elevation of the bottom lands in the river on this profile.

Mr. Rowe: What well was that?

Mr. McPherson: 12-20-26A.

The Witness: 12-20-26A.

Mr. Rowe: 12-20-26A?

The Witness: Yes, sir.

And below that gravel there is material, the symbol corresponding to that classified as sandy clay, clay, silt, and so forth, which is not an impermeable material. It will [7235] transmit water, although it

(Testimony of William I. Gardner.)

would not be a good aquifer. That extends to elevation 242.

There is then a bed classified as clay, 20 feet thick, and then a sand lens, and the bottom of the well encountered the sandy clay, clay, silt, and so forth.

Now, there are absolutely no confining beds in that well above the clay whose top is elevation 242; and to evaluate the possibility of extending that bottom clay any great distance laterally, we should compare it with other wells.

Now, in this immediate vicinity, there is no other well that deep, but we can go to a higher section and compare Well 12-20-26A with the two wells immediately to the right, and we see that there are clay beds in those wells, along with sand and gravel, but it is a very helter-skelter arrangement.

We can take the thickest zone of sand and gravel shown in 12-20-25, which is 25 feet thick, and if we compare it with the log of the well to the left, we find, in that 25-foot zone, clay, sand, clay, sand, clay and sand.

Or if we go to the clay in Well 12-20-25, underneath the sand and gravel I just mentioned, it is 20 feet thick. It extends below the bottom of Well 12-20-26B. However, we find in this last well, in the zone opposite the clay in 12-20-25, clay, sand, silt, sand, clay, and bottomed in sand.

So there is certainly lack of continuity in the beds in that zone. [7236]

The Court: From one to the other?

(Testimony of William I. Gardner.)

The Witness: Yes, that is right. In other words, you just simply cannot match the beds from one to the other.

The Court: What about matching them up above? I noticed by Exhibit 30, Mr. Lee puts an old channel of the river in Section 25, and another one—or two of them.

The Witness: You mean the "L" lines?

The Court: The "L" lines, L-17 and L-18, above the location of these two wells.

Mr. Rowe: Which two wells, your Honor?

The Court: 12-20-26B and—well, I don't know where 12-20-26B is. It is in Section 26, and there is an "L" line over by 19, L-19.

Withdraw my question.

Mr. McPherson: In that connection I might inform your Honor at this time that it will be our position, and we will show affirmatively both by this witness and others who testify on the subject, that we consider those lines to be entirely imaginary, not real, and having no significance at all.

If you wish us to go into it now, we will do so; but we intended to get into it in another sequence.

The Court: I might say I had not observed any contention on the part of the plaintiffs so far that the underground waters of the San Joaquin percolated along the line A—A.

Mr. Rowe: They certainly don't. For that reason we [7237] claim it is entirely incompetent and immaterial.

The Court: It isn't incompetent. It is their case.

(Testimony of William I. Gardner.)

Mr. McPherson: That isn't our purpose, your Honor, in presenting this exhibit. It is our purpose to show, by this section, which is one of six which will move across the valley, that the lenticular formation or the lenticular deposits which underlie the surface of the entire area, and that move across the valley, are that and nothing more, and there are no stratifications, no confined beds, to be found anywhere in this area.

We don't restrict ourselves to what Mr. Lee thought was material in this case.

The Court: I didn't anticipate that you would.

Mr. Rowe: I have no objection, on the witness' own theory, as to why he excludes the Kings River. So I will let him go into it, although I don't think it is material.

Mr. McPherson: We don't exclude the Kings River.

The Court: Let's go on, and get some testimony in the record.

The Witness: The beds, the clay beds in these three wells in the vicinity of Enterprise Canal, cannot be matched in their entirety. They cannot be matched at all with Well 12-20-26A, and there are only certain portions which can be matched across from Well 12-20-26B to Well 12-20-25.

The Court: That is, the clay beds? [7238]

The Witness: The clay beds. And there are some clay beds which cannot be matched at all from one well to the other. And there are some sand beds which cannot be matched at all.

(Testimony of William I. Gardner.)

There is no clay bed which would be opposite a clay bed of equal thickness in the well immediately adjacent to it. Neither is there any sand or sand and gravel bed in any of those wells which can be matched in its entirety with the corresponding material in the adjacent well. [7239]

The Court: Sand beds can be matched but not in their entirety on all three wells?

The Witness: Yes. The thinnest of the sand beds could be matched, your Honor.

The Court: In other words, you take any one of the wells, and lay a ruler across it and you will find sand in all three of the wells?

The Witness: That is correct; yes, sir.

The Court: But not of the same thickness?

The Witness: No. They are of variable thickness. And none of the clay beds can be matched.

The Court: In all three wells?

The Witness: Yes, sir, that is right.

So extending that interpretation to the clay shown toward the bottom of 12-20-26A it would be my conclusion that that clay bed could not extend certainly any further than we would find it here in the clays in 12-20-25. That is the only evidence that we could use, and judging from the three wells that would be the limit that we should conclude that that clay bed might be extended.

The Court: Although neither of the other two wells goes to that depth?

The Witness: That is correct.

If we continue at the same elevation for the

(Testimony of William I. Gardner.)

clay toward the bottom of Well 12-20-26A to the next well, which would be [7240] at the same elevation, we find that the top of that clay would be coming into Well 13/21-811 which is right of Dry Creek, and it would just be at the same elevation as the top of the bottom sand shown in that well.

We then continue that horizontal line on further to the right and we find that it matches up with sand, the bottom of Lee 75, and if we carry it on to the next well, which would intersect, which is Lee 184, we find that in that well also the material is sand and in the sand in Well Lee 174, which is sand in the the well designated Lee 184, it extends down to elevation 195 which would be far below the elevation of the clay shown in 12-20-26A, which would be conclusive that the clay in 12-20-26A could not extend as far as Lee 184 even toward the bottom of the clay member.

Now I have been discussing this particular area because it is a section which would run approximately or roughly across the cone line as designated by Mr. Lee and would therefore intersect these various beds approximately across the strike of the formation. That is more or less perpendicular to the dip of the bed, the inclination of the beds.

Also the ground elevations on the surface are roughly horizontal. There isn't any steep slope from the San Joaquin River out toward Dry Creek, and I have therefore——

The Court: There is a slope, though?

(Testimony of William I. Gardner.)

The Witness: A slight one. [7241]

The Court: How much? What is the difference in elevation between the top of the bluff and the lowest point shown on your cross-section here? The highest point on the top of the bluff——

The Witness: I was matching up the—or to answer your question, the highest point on the bluff would be just to the left of 12-20-26A.

The Court: It is about 25 feet?

The Witness: It is at 370, and in the area labeled Dry Creek it would be 350. But if we would match it—take an average of the general elevations across there because this surface has been modified by erosion, and so forth—if we took the top of the bluff, for instance, that line across there you see it is approximately flat, or if we match the terrace immediately to the left of that highest point, we see that it is flat and about the same elevation as the area to the left of Dry Creek.

So I have been correlating these beds trying to match them up from hole to hole on the basis of comparable elevations.

Mr. Rowe: The court might use its ruler and see where he has Well 75 of Mr. Lee's located.

The Witness: If we move over to the right part of this profile and study those beds, the ones to the left of the Kings River bottom lands, we find that the wells in this area [7242] have a very high proportion of sand and gravel.

The Court: Up the Hansen Ditch?

(Testimony of William I. Gardner.)

The Witness: I am speaking between the Hansen Ditch and the Kings River bluff.

The Court: By the way, what does this mean here where you have some of these wells starting below the surface of the ground?

Mr. Rowe: I am glad the court mentioned the Hansen Ditch.

The Court: The first one, for instance, and several of them along in that area, I notice you do not carry them up to the surface of the ground.

The Witness: Those would either be wells—for instance, these two on the extreme right, they are wells which would be at a lower elevation where the ground was at a lower elevation.

The Court: In a ditch?

The Witness: Or they might have been in the bottom lands of the Kings River.

You see, the Kings River here is making a big swing and it would be possible for some of the wells in the bottom lands to be projected onto the section at a point where the section was up above the bluff.

The Court: I notice one well, 14-22-16E, which appears to be the furthest to the left from the Kings River shown on [7243] the diagram, is about 20 or 25 feet below the surface.

The Witness: Yes. I was speaking before of these two wells on the extreme right.

There are other cases where the drillers did not keep a log of the top material and in those cases

(Testimony of William I. Gardner.)

we didn't have any data to continue the log on up to the ground surface.

Mr. McPherson: You will notice on the log of that well that you asked about, 14-22-15A the first 11 feet are not covered by the driller's log.

The Court: I see. That is about six miles from the beginning of A primed.

The Witness: Yes. There are those wells out there where we had no information about them.

The Court: Very well.

Mr. McPherson: Could we have the recess at this time, your Honor?

The Court: Very well. We will have the morning recess.

(Short recess.) [7244]

The Court: Proceed.

The Witness: Could I have the last question?

The Clerk: I will get the other reporter.

The Court: You were discussing—I don't think that is necessary. I had just asked you some question about how these wells did not happen to show to the surface, and Mr. McPherson called my attention to the fact that the particular well I referred to, the first 11 feet were missing on the chart.

Before that you were discussing wells adjacent to the Kings River——

The Witness: Yes.

The Court: ——and said they all had sand, and so forth.

The Witness: Thank you.

(Testimony of William I. Gardner.)

If we examine that group of wells east of the Hansen Ditch, which I was discussing, they are predominantly sand and gravel, with some clay beds interspersed within the sands. None of the clay beds could be matched up for more than approximately half a mile, which can be done in one spot between Wells 14-22-16C and 14-22-16. As measured along the section, I should say that you might possibly extend that clay zone for a half mile, but it does not match up with the logs of the wells on either side of it.

The group of wells in the central part of the section contain a higher proportion of the silt and clay-silt and clay materials than do—— [7246]

The Court: By the "central portion," do you mean between Dry Creek—or what do you mean by "the central portion"?

The Witness: Well——

The Court: Between Hansen Ditch and Dry Creek?

The Witness: Between the Hansen Ditch and, say, Well Lee 184, which is between Dry Creek and the Gould Canal.

There is a higher proportion of the finer materials logged in those wells. Much of the finer material is sandy clay and clay-silt, which is not impermeable material but will yield water to wells.

The Court: Is it tight?

The Witness: No, your Honor, it is not tight. It will transmit water.

(Testimony of William I. Gardner.)

The Court: Well, will it transmit water as easily as sand or gravel or cobbles?

The Witness: It will not—if you are comparing materials of comparable age, that is, a silt compared with a sand of comparable age, and if it is a well-sorted sand—by "well-sorted" I mean we have a range of uniform size—then that sand would form a very permeable material.

The Court: But if it is silty sand?

The Witness: If it is a poorly sorted sand, then it has less permeability.

The Court: All these wells of the same formations, or [7246] whatever you call it, are the same geologic age?

The Witness: Approximately, your Honor. And I will say, in answer——

The Court: Do any of these wells get down to what you call the age when it was deposited in lake beds, still water?

The Witness: No, I wouldn't say so.

The Court: They are all true alluvium?

The Witness: All true alluvium.

Mr. Rowe: Can I get an answer to the court's question, whether sandy silt is considered a water-bearing formation for water wells?

The Court: What is your opinion on that?

The Witness: Sandy silt——

The Court: Sand, with interstices filled in with silt.

The Witness: I thought I answered that question, in comparing that type of material with well-

(Testimony of William I. Gardner.)

sorted sand, that it would not have as high permeability as the well-sorted sand. It would have lower permeability.

The Court: Or clay?

The Witness: Clay would have a still lower permeability, or is commonly called impermeable.

Now, that is a relative term. It does not mean it will not transmit water, but it is relative. Compared to the sands and the silt and the gravels, why, it is impermeable.

Now, we must also realize—— [7247]

The Court: That is the subsurface clay you are speaking of?

The Witness: Yes, sir.

The Court: You are not speaking of the surface clay which you described yesterday?

The Witness: No, I am speaking of the clays which are shown——

The Court: In the subsurface?

The Witness: In these wells, in the subsurface area. [7248]

Mr. Rowe: I submit he never answered the court's question, whether sandy silt is a water-bearing aquifer.

The Court: Yes, he did. That was his answer.

Mr. Rowe: That is what he said.

The Witness: It will yield water to wells.

These are logs prepared by the water well drillers and they represent extremely valuable material. However, it is the business of the water well driller to drill wells and his terminology is not

(Testimony of William I. Gardner.)

always scientifically accurate, and we find that material which is logged as clay in a well may still yield water because the well is producing water.

So that you cannot interpret these logs where it says "clay" to mean it is strictly clay and absolutely impermeable.

The Court: It might be in one instance by one well driller's idea but not in another?

The Witness: That is right. Lots of times it is called clay because it is not a good water-bearing zone and they want to go where they get an excellent zone or a good zone.

If I might go to Exhibit Y-2 unless there are some other questions on Y-1?

The Court: What significance do you attach to the sandy formations in the wells adjacent to the Kings River in connection with your statement the first day you testified that the underground water from the Kings flowed generally northwesterly?

Mr. McPherson: I think the witness' testimony was that the actual flow in the Kings River flowed westerly through the city of Fresno.

Mr. Rowe: I agree with Mr. McPherson.

The Court: Well, whatever his testimony was.

Mr. Rowe: The stream itself at one time did, not the underground.

Mr. McPherson: He did not refer to the underground as your Honor put it; he was referring to the flow of the stream.

The Court: Well, do you attach any significance to these formations being of similar character ad-

(Testimony of William I. Gardner.)

jacent the Kings River in connection with any underground water flow in the Kings River, if there is any?

The Witness: You are speaking, as I understand it, to this group of wells to the right of the Hansen Ditch which show a very high proportion of sand?

The Court: Yes.

The Witness: Yes, I would conclude that those are permeable materials and if the water was at a suitable elevation—by that I mean if the ground water slope was from the Kings River and dropped in elevation so that the water table and the steepest gradient of the water table in this particular locality lay directly along this profile, and the water table dropped in elevation to the right, then the water could seep from the Kings River through those materials. [7250]

Mr. Rowe: I ask that that answer be stricken as assuming something not in evidence. He said "if." There is no water level bottom of either the Kings River shown or the San Joaquin or the water level into the Kings or the San Joaquin River.

The Court: Overruled. It stands for what it is worth. I do not know what evidentiary value it has. He says, if so-and-so. It has two "ifs" in it, but that is his answer.

Mr. McPherson: Your Honor, you can't cover every item that is in this case in one answer to one question. The water elevations are in evidence,

(Testimony of William I. Gardner.)

the evidence of the flowing streams is in evidence, and it is simply a matter of reading them.

The Court: It is his answer.

Mr. McPherson: Yes.

The Court: The long and short of his answer is that it is possible.

Mr. McPherson: Certainly.

Mr. Goldberg: And the ruling is that the answer is not stricken?

The Court: The answer is not stricken.

Mr. Rowe: I ask that the last question and answer of the witness be stricken based on two "ifs," and if it is based on two "ifs" it isn't possible. There is no basis for a possibility there.

The Court: Motion denied. [7251]

The Witness: Can I amplify my answer?

Q. (By Mr. McPherson): In that connection you can, if you wish. I think we want the court to know as we come to it that the witness will read the water contour maps and whatnot. He can't answer all of the case in one question.

Go ahead and make your explanation.

A. To make a shorter answer to your question, there is no material in that group of wells which would obstruct the flow of the water from the Kings River underground.

Mr. Rowe: Not even 14-22-5?

The Witness: Now referring to cross-section B-B primeed, which is Exhibit Y-2, which runs from the San Joaquin River downstream about one

(Testimony of William I. Gardner.)

mile from Lanes Bridge in Section 29, Township 12 South, Range 20 East, it runs southerly——

The Court: By the way, this is the one that is called the Sanger-Fresno-Pinedale cross-section?

The Witness: Yes, sir.

It runs southerly to the southeast corner of Section 20, Township 13 South, Range 20 East, where there is a bend that runs for about a mile and a half in a southeasterly direction, where there is another bend and it runs in a more easterly direction to the east section line of Section 19, Township 13 South, Range 23 East. [7252]

Q. (By Mr. McPherson): Township 14 South, isn't it, Mr. Gardner?

A. Excuse me. Township 14 South; yes, sir.

Q. Does any part of that section run along any of the profiles heretofore offered in evidence in this case?

A. On Exhibit 62——

The Court: Geologic Profile No. 2 runs generally along there from about down to the bend below Herndon.

The Witness: Yes, to the first bend that I mentioned.

The Court: About that area.

The Witness: It is along the same line.

Mr. McPherson: You don't mean below Herndon, do you?

The Court: No.

Mr. Rowe: Profile 2?

The Court: Profile No. 2 taken from Exhibit

(Testimony of William I. Gardner.)

62 runs generally along the line from B to a point on Exhibit Y-2 which is just below the Herndon Canal.

Mr. McPherson: Yes.

The Witness: Yes, sir.

Mr. McPherson: And Profile No. 2, Geologic Profile No. 2, as it is shown on Exhibit 62 was offered as a separate exhibit and numbered 66.

The Court: That is right. [7253]

The Witness: If we go to the left portion of this profile, there is a well in the bottom-land area of the San Joaquin River designated "Lee 116." The upper portion of that well, you can see, is in soil, and then there is sand and gravel to the top of clay; and we estimate that the recent channel fill of the San Joaquin River would be represented by the sand and gravel and soil, which would be approximately 40 feet in thickness—approximately 45 feet in thickness.

In proceeding beyond the bluff line, there are these various wells extending out to the first bend in the section. I will discuss this first group of wells in the area labeled "Camp Pinedale."

On the upper part of those wells, we find that there is a fairly high proportion of the silts and clays which extend down to approximately elevation 280—pardon me, 220. Below that elevation there is a high proportion of the sands and gravels.

Now, it might be assumed that the clays in the top zone could form or could extend for a great distance southerly, even though, as we see in go-

(Testimony of William I. Gardner.)

ing from well to well here, they do not match up entirely. You go from clay to sand, from sand to clay, or from clay to silt, to clay to silt, which indicates that they are not even in their entirety impermeable beds.

The Court: What is the exhibit number that has the city [7254] wells numbered on it? I have so much difficulty in finding well numbers on 62. You referred to them as "City 17," "Lee 108," and so forth.

The Witness: They are given on the map.

The Court: They are given here. For instance, I was looking for Lee well number——

Mr. Rowe: It might be helpful to the court to know that Lee's wells are referred to as being the ones in Exhibit 54, and I think very rarely, if ever, in his profiles. They refer to them as Lee's wells way over at the intersection of the Gould Canal beyond Clovis Avenue.

The Court: In spite of the fact you say this Exhibit 54 is indexed, Mr. Rowe, it is not.

Mr. McPherson: Your Honor, if you want the city wells, a map on which the city wells are located geographically is Exhibit 35.

The Court: I wonder if I might have that.

(Exhibit handed to the court.)

The Witness: In studying this profile, I have considered the fact that it is running in a southerly direction, and it would tend to correspond to the direction of some of the channels, the ancient channels, of the San Joaquin that have been postu-

(Testimony of William I. Gardner.)

lated to extend from the San Joaquin River in a southerly or southwesterly direction. And in attempting to correlate or match the beds in these wells, I have not matched [7255] them up at equal elevations from well to well.

Instead, I have taken the slope to have been eight feet per mile; and I have used—the slope of the channels or the deposits when they were being laid down; and I have used that gradient in comparing wells, and I find that, in matching this first group of wells in Camp Pinedale, that the clay, the top clay, in Well 12-20-32 will match up with the silt in the adjacent well, and the top of the clay in the next well to the right, and with the top of the silt in the fourth well, 12-20-32B.

So I extended that line farther to the right, to Well Lee 202, and I find that in that well this top line, the top of the clay, would be matching up against sand. And if we took the——

The Court: Let's see, you say the surface gradient is eight feet per mile from B down to the point where B bends below "Herndon"?

The Witness: No, your Honor. The ground slope is less than that. I took that gradient as representing the gradient to use in matching up beds from well to well, which would correspond to the gradient of the stream which was laying down the beds. The present——

The Court: You mean that at the point where this line from B' turns due north, to the end of

(Testimony of William I. Gardner.)

the line at B, you assume eight feet per mile sloping that way or the other way, south? [7256]

The Witness: Sloping south from the bluff line, southerly.

The Court: In other words, if there was a sand deposit and it was continuous, it would be eight feet higher every mile?

The Witness: Yes, that is right. In other words, these streams have to have a gradient to flow down that far, and the channel deposits or floodplain deposits in the river would have a slope corresponding to the floodplain that existed at that time.

Mr. Goldberg: That is, you are trying to match these on the theory there was an ancient stream channel flowing more or less in this direction?

The Court: And at that gradient.

Mr. Goldberg: The stream would have to have that.

The Court: It wouldn't have to have eight feet a mile.

Mr. Goldberg: It would have to have some gradient.

The Witness: That is the gradient of the San Joaquin River at the present time, through this area. [7257]

The Court: All right.

The Witness: That is the average.

Mr. Rowe: I didn't hear that last remark.

Mr. Child: He said that was the average grading of the San Joaquin River at the present time.

The Witness: And continuing that same process

(Testimony of William I. Gardner.)

further, I find that the bottom of the silt in Well 12-20-32B would encounter the 202 well approximately 4 feet below the bottom of the sand so the bottom then of the silt would be in contact with clay in Lee 202.

Extend that to the next well, Lee 105, I find that the material would be in contact with silt.

If I extend it still further where the line intersects Lee 174 it would be in contact with sand.

So that it is impossible to extend the clay and silt zone which we found in the first four wells through the next group of wells.

Therefore that would restrict the extent of that zone of finer semi-pervious to impervious material. It would be impossible for any of the clay zones found in the first group of wells where you match from well to well to be extended down to the cone line as established by Mr. Lee.

It is my conclusion on that same point that there would be no confining zone throughout that entire area.

We now come to—— [7258]

Q. (By Mr. McPherson): And by your answer that it is your opinion that there was no confining zone throughout that area, do you mean that you have an opinion as to whether there are any confined aquifers leading from the San Joaquin River along the general direction of this section?

A. Yes, I have an opinion.

Q. What is that opinion?

A. It is my opinion that there is no aquifer

(Testimony of William I. Gardner.)

which is entirely confined from the San Joaquin River down to the edge of the cone as defined by Mr. Lee.

There are possibly small confining zones, as we have here, such as I have been discussing, that might extend a matter of a couple of miles, but I wouldn't carry them any further than that.

If we move to Lee Well City 10, which is in the city of Fresno and is shown on the profile in the vicinity of Dry Creek Canal, now here is a well which is logged almost entirely in clay. The well is 240 feet deep, approximately, 242 or thereabouts, and contains about 9 feet of soil, 5 or 6 feet of sand in one sand zone and 2 feet in a small sand zone down near the bottom. And, as I say, the rest of it is logged as clay. Yet that is a producing well and it has a specific capacity of 78 gallons per minute per foot of drawdown, and I am citing this as an example of how, although [7259] material may be logged as clay, it may yield water to wells. We cannot interpret the materials which are logged as clay as being impermeable.

Q. Is that specific yield which you have given us average in the location?

A. I have the figures for some other wells in this same area.

Now I am really referring to specific——

Mr. McPherson: We have an exhibit, your Honor, so counsel will understand what we are doing, which will show the specific yield of all the

(Testimony of William I. Gardner.)

wells which we consider to be materia' and it will be covered by a map.

The Court: Very well.

The Witness: I have used "specific yield" in the same sense it was used by Mr. Lee, but ordinarily we refer to it as specific capacity so if I interchange the two terms I am meaning the same thing here.

Now, then, the specific capacity of City 17, which is to the left about a little over three miles, it has a specific capacity of 96.

Then we come to City 35, to the right, which has 124; City 10, 78; City 37, 143; and City 14 a specific capacity of 57.

The Court: Both 14 and No. 10 show a great deal more clay than the others? [7260]

The Witness: Yes.

Mr. Rowe: What was the capacity of 14?

The Court: 50-odd, he said.

Mr. McPherson: 57. [7261]

The Witness: Those are the two low wells in the lines I have given.

The Court: They are the ones which show less sand than any of the other wells in the group?

The Witness: That is correct. They are the poor wells among this group, and yet again City 10, although it contains a very minute portion of sand, is a fairly good well.

The Court: What does it produce as against City 35, which shows quite a large proportion of sand, gravel, and cobbles, or whatever you call it?

(Testimony of William I. Gardner.)

The Witness: City 35?

The Court: Yes.

The Witness: It has a specific capacity, 124.

The Court: Go ahead.

The Witness: I believe that would conclude my discussion of that profile, and we can move to the Centerville-Fresno-Helm cross-section, C-C', Exhibit Y-3.

The Court: On this last one here, is the Hansen Ditch shown on this?

No, it doesn't cross the Hansen Ditch.

Mr. McPherson: Which is this now, C-C?

The Court: B-B, I was asking—before he left, I was comparing the Kings River, adjacent——

The Witness: No, it doesn't cross the Hansen Ditch. However, you see the same grouping of wells of high proportion [7262] of sand over toward the right end of it.

The Court: DWR 14/22-14G1, shows just a little sand.

The Witness: Yes, it is a well—it shows a little sand—bottomed in sand and gravel.

The Court: And it is only about two miles from the Kings River?

The Witness: Yes, sir.

The Court: And on the edge of the City of Sanger?

The Witness: It is about a mile from the bluffs. I don't know what that well is. It might be just a domestic well.

* * * * *

The Court: How far is it from Highway 41?

(Testimony of William I. Gardner.)

Mr. Rowe: It is up by Mr. Rank's house.

The Court: On the north side of the bluffs?

Mr. Rowe: No, on the south side. We are not going to [7263] take you over into Madera County. We will let Mr. Ingerson prove his case there.

Mr. McPherson: I would like now to go on the Madera side. This alleged mud flow, which Mr. Lee gave us as located in Section 3, Township 12 South, Range 20 East, near Lanes Bridge, I want that included in the trip, because we cannot find any such thing.

Mr. Rowe: I may have to get Mr. Lee to do that later. He is pretty well tied up. He couldn't come over to court.

Mr. McPherson: He was over here just a few minutes ago. I saw him.

Mr. Rowe: After all, I am paying him.

The Court: How far is it from Highway 41 we have to go tonight?

Mr. Rowe: Do you know where Mr. Rank's place is?

The Court: Generally I know about where it is. I don't know where he lives.

Mr. Rowe: Do you remember Mr. Bolton's?

The Court: Yes.

Mr. Rowe: In that area. I don't know how many miles it is, but it is not very far—just in that area. Not over half a mile apart.

The Court: We will recess until 2:00 o'clock.

(Whereupon, at 12:00 o'clock noon, a recess was taken until 2:00 o'clock p.m. of the same day.) [7264]

July 16, 1952; 2:00 O'Clock P.M.

The Court: Proceed.

Mr. McPherson: In accordance with the court's suggestion of this morning, I hand the clerk two conformed copies of Contract No. 175r-4950, being a contract for temporary water service dated the 1st day of April, 1952, between the United States and the Gravelly Ford Water Association covering the term April 1, 1952 to February 28, 1953.

The Court: It will be filed in the case.

Mr. Rowe: Just so I don't forget things, is there any objection to Plaintiffs' 169 going into evidence?

Mr. McPherson: No.

The Court: Admitted in evidence.

(The document referred to was received in evidence and marked Plaintiffs' Exhibit No. 169.)

The Court: Proceed.

WILLIAM I. GARDNER

the witness on the stand at the time of recess, resumed the stand and testified further as follows:

Direct Examination—(Continued)

Q. (By Mr. McPherson): Go ahead, Mr. Gardner.

A. We were going to take up the cross-section, Centerville-Fresno-Helm, C-C, primed Exhibit Y-3.

This is a section which starts in the trough of the valley in Section 16, Township 16 South, Range 17 East, runs in a northeasterly direction to the south-

(Testimony of William I. Gardner.)

east corner of Section 3, Township 14 South, Range 19 East, thence runs in a direction a little north of east to the northeastern part of Section 1, Township 14 South, Range 20 East, and thence in an easterly direction along the township line to the Kings River and a little to the east of the Kings River to the northeast corner of Section 4, Township 14 South, Range 23 East.

We are looking, when we are looking at the profile, we are looking in a generally northerly and northwesterly direction.

Q. Northeasterly, is it not?

A. When we look at the profile itself——

The Court: You mean from the bottom of the map?

The Witness: I am starting at C-C primed to the first bend, we are looking in a northwesterly direction at the section. The line of section——

The Court: That is, from the bottom of the map? If you turned it upside down you would not be look at it that way.

The Witness: I am speaking of the section itself rather than——

The Court: I understand. In other words, from the bottom of the map, the way you look at it you look at it northwesterly. [7266]

The Witness: That is correct.

The Court: Suppose I look at it this way, I would not?

The Witness: No.

If we look at the line of the section on the loca-

(Testimony of William I. Gardner.)

tion map to the point C at the left end of the section, there is an arrow which indicates the direction that we are looking when we look at these logs up here on the section.

The Court: If you look at it from the bottom of the map.

The Witness: All right.

The Court: In other words, assume you were over here at the intersection of Highway 99 where it goes off the map, from that direction it is northwest.

The Witness: In this section it is as if we made a vertical cut across the valley and this part of the cut that I am talking about would be running in a southwest-northeast direction.

The Court: That is from C up to the first bend?

The Witness: That is right.

The Court: From there on, why, you are looking due north.

The Witness: Yes, almost north to due north, at the right end of the section we are looking due north.

The Court: From the bottom of the map.

The Witness: All right. [7267]

If we start this time over at the right end of the profile we find that the logs are quite similar to the well logs that we have examined in the previous profiles.

The Court: The first one does not show any sands, does it?

The Witness: Yes, there is some sand and gravel

(Testimony of William I. Gardner.)

in there, your Honor. That is 13/23-33F1. There is sand and gravel both.

The Court: Yes, I see it.

The Witness: And there is some clayey gravel which they have not colored. You see those little circles in with the clay which is a clayey gravel and that has not been colored yellow.

Mr. Rowe: Isn't that gravel and cobbles?

The Witness: We haven't distinguished between gravel size and cobble size.

The other logs in this general area proceeding westerly show sands and gravels with some clay. These logs are characteristic of the logs on the upper parts toward the apex. At the apex of alluvial sands where sorting action is poor and the stream has not had an opportunity to sort out the sands from the gravels, and so on.

That first log is a good illustration of that, where we have a mixture of gravel sizes throughout the entire section of the well, and at places it is intermixed with sand and at [7268] places the gravel is intermixed with the clay. That is on the upper part of the fan where the sorting action is poor. That is also in the bottom lands of the Kings River in that area. [7269]

The Court: I see. That is in Section 33?

The Witness: Yes, it is in Section 33, Township——

The Court: 13 South, 23 East?

The Witness: Yes, sir; Section 33, Township 13 South, Range 23 East.

(Testimony of William I. Gardner.)

The Court: Is that what you call Centerville bottoms?

The Witness: The bottom lands in that area are called the Centerville bottoms.

The Court: They are very wide?

The Witness: Very wide.

I will correct my statement about that being in the bottom lands. I don't have the exact location, and I cannot make certain of that at this time. However, it is typical of the sort of deposits that are laid down in the upper parts of the alluvial fans, where the rivers have an opportunity to deposit the material which they have been carrying down out of the mountain ranges and which they have not had an opportunity as yet to sort out the various sizes of the materials.

Then, as we proceed westerly, there are the shallow wells, the sand, gravel, and a little clay and the amount of fines in increase, proceeding westerly.

We come to the City of Fresno, which is—as labeled on the profile, from the City of Fresno, which is very close to the point of fold or the change in direction of the section—that point is approximately eight miles from the right end of [7270] the section—and we find that the logs show a greater proportion of fine materials. According to the symbols they contain a very high percentage of what the drillers have logged as clay; but to show how even these fine-grained materials produce water, I will——

Mr. Rowe: Not to interrupt, but may I ask the

(Testimony of William I. Gardner.)

witness, he says "it shows." What shows? You mean what section shows a greater percentage of clay?

I object to it on the ground the statement is indefinite.

The Court: Yes, I think he should clarify that. What do you mean, "it shows"?

The Witness: By "it" I was referring to the profile, meaning that as we move out into the valley, which in this case is westerly, the well logs show a high proportion of clay.

Looking at it by inspection, that there is a——

Mr. Rowe: I object to that as being indefinite. I think he ought to indicate the section on his profile that indicates that.

The Court: No.

Mr. McPherson: We are trying to avoid dealing with each well separately, your Honor.

The Court: All right, go ahead.

The Witness: By inspection of the graphic logs here, and comparing the colored areas in yellow, which are the [727?] sands and the gravels, with the uncolored areas in the logs in the wells, the uncolored areas being clay, sandy clay and silt, we find the white areas would predominate in the well logs; and that becomes even more pronounced as we go still farther west out into the trough of the valley.

Now, within the City of Fresno there are four wells for which I have data on the specific capacity; and, starting with City Well 19, we found that it had a specific capacity of 106 gallons per

(Testimony of William I. Gardner.)

minute per foot of drawdown. Now, that well has silt, sand, and gravel in it, by inspection about one-third of the thickness of the materials being logged as clay, approximately one-third being logged as sand, and about the same proportion being logged as silt and soil. The specific capacity, 106, would indicate a good, a reasonably good well in that area.

We go to the next well, with a specific capacity of 57——

The Court: Which is that, City 14?

The Witness: City 14.

The Court: That is shown on one of your other logs, too, or cross-sections.

The Witness: I believe it was shown on just the preceding cross-section, yes.

The Court: Capacity how much?

Mr. McPherson: 57.

The Witness: In that well, the clays and silts predominate. [7272]

In City Well No. 1, which is sand and silt, the greater proportion of the well being in silt, it has a specific capacity of 140.

The Court: Now, your legend there, the vertical lines, it says, "Sandy clay, clay-silt, etc." In other words, it isn't clay?

The Witness: That is correct.

The Court: It may be sand or——

The Witness: Well, it wouldn't be sand. It would be——

The Court: Anything less than gravel, between clay and gravel?

(Testimony of William I. Gardner.)

The Witness: Between clay and a sand.

Now, then, we say "sandy clay"; that means——

The Court: Water-producing?

The Witness: Yes. As I explained earlier, that will yield water. Or it may be a clayey silt, or may be a sandy silt.

The next city well for which we have the specific capacity is No. 11, which has great thicknesses of sand. Its specific capacity is 137, which can be compared with City 1, with the specific capacity of 140, but with a smaller proporation of sand, and most of the material being sandy clay, clayey silt, and so forth. [7273]

Again bringing out that the sandy clays, clay silts, and so forth, will yield water.

This particular well, having the highest specific capacity of any in this particular group and yet having a low proportion of sand.

The Court: Where is it located with relation to the old Dry Creek channel, is City No. 1?

Mr. McPherson: Do you have that City map?

The Court: Yes.

(The exhibit referred to was passed to counsel.)

The Court: I see it. It is southerly of what Mr. Lee placed as the Dry Creek channel and out of the San Joaquin cone. It is a combination of the cones of Dry Creek and Dog Creek, I guess it is.

Mr. Rowe: It has been abandoned for years, your Honor.

(Testimony of William I. Gardner.)

The Court: What is the date of the capacity of 140?

Mr. McPherson: City Well No. 1 does not appear to have been abandoned in the exhibit which counsel offered in this case and has marked as Exhibit 35. There are only four abandoned wells, No. 4, No. 5, No. 12—only three abandoned wells—No. 4, No. 5 and No. 12, according to Plaintiffs' Exhibit 35. Neither No. 1 nor No. 11 nor any well referred to by this witness has been abandoned, according to this exhibit.

The Witness: According to some other data that [7274] I have here, these specific capacities which I am giving, which is indicated on another map as just having been made in May of 1949.

The Court: By the way, in reading this map you take the first set of numbers as the township, is that correct?

The Witness: Yes, sir.

The Court: The second as the range?

The Witness: The range.

The Court: And the third as the section?

The Witness: That is correct.

The Court: How do I find Township 13 South, Range 12 East, Section 31 on this map? That is 13 South, 12 East, which would be over beyond Coalinga, would it not? 13, 12, 31? Is that Township 13 South, Range 12 East?

The Witness: No, 13 South——

The Court: There it is. It says 13 South, 12 East, 31.

(Testimony of William I. Gardner.)

The Witness: Yes, I notice that, and I see at the left 14, 21 and to the right 14, 21. I will have to check that.

The Court: Do you think somebody might have made a mistake?

The Witness: They undoubtedly did, sir, either a typographical error or——

The Court: You mean you wish to correct the error?

Mr. McPherson: I have made this suggestion, your Honor, that when the witness has finished the use of this exhibit [7275] and its description, we will ask permission to withdraw your copy and we will legend on the inset in red dots the wells shown on the section.

The Court: I would like to show it that way.

Mr. McPherson: That is probably a mistake. We will have to verify that.

The Court: 13 South, 12 East, that is over around Coalinga someplace.

The Witness: I think they have perhaps transposed the "1" and the "2" in the range number. I think that is what happened.

The Court: I was looking for the well and I could not find it.

Very well.

Mr. Rowe: I notice this well has a green circle around it. I don't know what that means either.

The Court: As I remember it, the witness who produced this map testified that wells in that condition, they had drilled a second well. In other

(Testimony of William I. Gardner.)

words, there was Old Well No. 1 and then there was a double circle around it which meant there was another well built alongside of it. And that is the same with Wells 1 and 12 and——

Mr. McPherson: No, the legend on Exhibit 35 shows that is only where there is a square block. That is not one of the wells having a square block, your Honor. [7276]

Mr. Rowe: There is nothing on there showing what the green circle means.

The Court: There is a green circle and two red circles around No. 1. I have forgotten what it is. It seems to me like it was a redrilled well.

Mr. McPherson: My recollection of it was that it was a well in existence when the City took over the water supply, but I don't remember.

The Court: We will have to look at the record.

Very well. Proceed.

The Witness: I will check that particular well.

The point that I am trying to get at here is that the size of the material, whether it is gravel or sand size or silt size or clay size, is not an absolute determination of the permeability or the impermeability, the water transmitting capacity of the beds nor of the yield of the wells; that the important——

The Court: I think the plaintiffs' witness has testified merely that the clay was less permeable.

The Witness: That would be my interpretation of this material, that the clay is not, up in this area that I am speaking about.